The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The British Chemical Plant Industry

ORGANISATION is the keystone of modern industry just as it was formerly the keystone of industry in pre-industrial-revolution times. The formation of guilds arose from the need of mankind to act in unison to achieve vital interests. Æsop's fable of the strength of the bundle of sticks is applicable to more than the field of international power politics. But not all industries operated in guilds, and some industries, such as iron manufacture, consisted of disintegrated units, some making iron, some refining iron and others manufacturing goods from the iron. The workmen, too, were unorganised and were hired on individual terms as between master and man. Organisation within the iron and steel industry has been of comparatively recent growth, and in its modern aspect of very recent growth. The weakness of lack of organisation is, of course, that it leads to price-cutting which, as was seen after the first German War, could lead to a very serious situation. It leads also to unequal distribution of work. We have now become generally conscious of the fact that it is to the consumers' advantage that they should be served by a strong manufacturing industry in which all units are represented and in which decisions regarding prices and so forth shall be taken in concert, but with the concurrence of the Government to ensure that the organisation does not develop into a money-making price ring.

Types of industrial organisation which involve such matters as marketing, price regulation and equitable allocation of work are those with which modern industry is familiar. There is, however, another problem not touched by any existing organisations, so far as we are aware. Attention was called to this in a paper recently presented by Mr. B. N. Reavell and Dr. G. E. Foxwell to the Chemical Engineering Group of the Society of Chemical Industry, which is due to come up for discussion by the Group on Friday next. This is not a problem of avoiding price depression, or of pooling work, but of avoiding loss of orders by pooling knowledge. The authors review the growth of the chemical plant manufacturing industry and show that in its gradual growth from more or less home-made plant and appliances to the modern highly scientific and complicated plant often requiring great skill in design as well as in manufacture and perhaps composed of many materials, the time has passed when any one firm can expect to keep abreast of the progress of chemical manufacture. Every manufacturing industry is based on a plant manufacturing industry, just as most plant manufacturing industries are themselves based upon a strong metallurgical industry. It would seem that the chemical plant industry in this country is less strong than it is in some foreign countries. It would also appear that the demands of the home chemical industry for plant are insufficient to keep a strong plant manufacturing industry at work, and that it is essential that the British chemical plant industry, like the German and American plant industries, should have a world market.

There are many difficulties confronting the international plant maker, not least of which is the number of " dud " inquiries he receives, upon which he must waste time giving information that will never be remunerative. There is also the need to keep abreast of modern developments in industries in which he probably has no close contact. British chemical plant manufacturing firms are in no way inferior in manufacturing skill to their foreign competitors, but they have not the same international reputation. Why? Is it because they have not the same chemical engineering background and they are primarily engineers when they should balance engineering with chemistry? In order to balance engineering with chemistry large and costly staffs must be employed in addition to the engineering staff that normally forms the personnel of the works. To justify this staff there must be a flow of orders for chemical plant and, if the home market cannot supply enough of these, a strong export trade must be built up. How is this to be done?

Quite obviously the authors of this paper have "trailed their coats " in the hope of a vigorous and helpful discussion, which will doubtless materialise next week. It is no secret that informal meetings of the B.C.P.M.A. have discussed this very subject and that to some extent this paper is the outcome of these discussions. There is one point on which readers of THE CHEMICAL AGE might like to air their views in these columns. Messrs. Reavell and Foxwell have shown the difficulties that beset engineering firms in keeping abreast of chemical process development. These difficulties, more than any deficiences of manufacturing skill, have been responsible for the lack of international appreciation of the undoubted strength and qualities of the British chemical plant industry. These same difficulties, however, seem to have been successfully overcome by German, American and certain other chemical plant firms. What is the secret of their success in this direction and what is the organisation that permits them to quote for so wide a range of complete chemical processes?

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NOTES AND COMMENTS

Works Maintenance

NOW, more than ever, it is essential to insist on the importance of works maintenance. Under war-time conditions, with increased production in the chemical industry, often accompanied by dilution of labour, the maintenance of plant in its optimum working condition becomes an absolutely vital necessity, and the chemical engineer must exercise exceptional vigilance in this respect. It may be that he is working under unusual difficulties, as the normal organisation of the works is likely to be upset by exceptional demands—and good organisation is one of the main planks upon which efficient works maintenance is founded. But he must regard the extra vigilance required as part of his war-time effort; and indeed it is no exaggeration to say that his work in maintaining plant in proper condition fulfils a thoroughly national purpose. In works where the plant suffers from inadequate maintenance not only does the output fail, but also the health and safety of the workers is endangered. Casualties in a vital concern such as the chemical industry are fully as disastrous as losses in the front line; and they are all the more to be deplored when it is realised that, with proper attention to the maintenance of plant and works, they are to a great extent avoidable.

The Platinum Metals in 1939

WORLD production of platinum metals in 1939 will prove to have been about 500,000 ounces and world consumption appears to be proceeding at a rate that will about equal production. The principal market for platinum metals continued to be the United States, where, it is indicated, imports for the year will exceed 250,000 ounces. The countries from which the United States imported the major portion of the platinum metals were, in order of their importance, Great Britain, Russia, and Colombia. Exports from the United States, largely made to France, Germany and Japan, will probably not exceed normal, and it is to be noted that since the outbreak of the war such export deliveries have diminished, particularly to Germany. As was the case elsewhere, the beginning of the war saw the market for platinum metals somewhat disorganised. Government regulations as well as government requirements for platinum metals found the United States and other neutral countries with inadequate supplies. A demand soon developed that forced up the price of platinum from $35.00 to $42.00 per ounce. Iridium rose from $65.00 to $175.00 per ounce. The price of ruthenium increased from $35.00 to $39.00, but palladium, at $24, and rhodium, at $125, kept steady.

Platinum Metals in the Chemical Industry

THE development of industrial uses for the platinum metals was one of the important activities of the year. The commercial production of thin coatings of platinum or palladium on large sheets of base metal is one example, and platinum-clad tubing is another. The interest of the research and operating divisions of the chemical industry in this type of material has necessitated further investigations of the resistance of platinum and its alloys to corrosion. Increasing interest in catalysts has inspired further study of the properties of palladium as a catalyst, while platinum alloys continue to figure prominently in the new glass fibre industry and in the chemical industry for rupture or so-called safety discs, particularly in equipment handling fluorine compounds or other corrosives. In the production of nitric acid and nitrogen oxides, platinum-rhodium alloys are in extensive use all over the world, particularly in neutral countries, which have found themselves quite dependent upon their own resources for nitric and other acids. There has been continued interest in platinum as a catalyst in the production of sulphuric acid. In the production of rayon the position of platinum alloys has expanded with the introduction of platinum-rhodium alloy spinnerets.

Ag_2O as Oxidising Agent

THE possibility of using silver oxide as an industrial oxidising agent is raised by an investigation carried out by Dino (*Ann. Chim. Appl.* 1939, *29*, 10, 448-451). Silver oxide freshly precipitated from silver nitrate solutions with alkali is the best known laboratory agent for the conversion of aldehydes to the corresponding acids, the oxide being quantitatively reduced to silver at the same time. The cost of silver renders the commercial use of its oxide in the quantities necessary impracticable, owing to the inevitable losses that would occur in handling such large quantities. It has been found, however, that a mixture of silver and cupric oxides, obtained by adding caustic soda to a solution of copper sulphate containing an amount of silver nitrate equal to 1 per cent. of the weight of copper sulphate present, is practically as effective as the equivalent amount of pure silver oxide. In experiments (laboratory scale) furfural was oxidised to pyromucic acid in 2 hours with a yield of 91-93 per cent., and benzaldehyde converted to benzoic acid with a recovery of 92.6 per cent. Cupric oxide alone is very inefficient. The action of the silver oxide may be regarded as catalytic, the following reactions occurring:—

$$Ag_2O + R.CHO + NaOH \rightarrow 2\,Ag + R.COONa + H_2O$$

$$2\,Ag + CuO \rightarrow Ag_2O + Cu_2O$$

The CuO is thus considered not to take any part in the actual oxidation, but to serve as a means of perpetually regenerating the more efficient Ag_2O.

ARC WELDING FOR MAINTENANCE IN CHEMICAL WORKS

By
ROBERT BUTLER

TO repair broken machinery and equipment parts was one of the first uses to which the electric arc was put. In its use solely as a repair and general maintenance tool, the electric arc welding process saves industry many hundreds of thousands of pounds annually. With the developments in the welding of alloy steels and non-ferrous metals, welding has become of particular value to the chemical industry, not only for repair work but for alterations to existing equipment necessitated by increased production.

With the recent advances in the technique of the modern electric arc welding motor generator unit, arc characteristics and conditions can be accurately controlled by the welding operator and, with adequate preparation and due consideration of the effects of heat, many valuable jobs are being carried out on chemical equipment. Motor generator units delivering direct current at the arc are almost invariably used for this type of work because with these machines not only mild steel but also aluminium, copper, bronze, brass, stainless steel and many other metals commonly used in the chemical industry can be welded by the metallic or by the carbon arc.

The modern welding generator is of the drooping characteristic type, the voltage at the arc automatically adjusting itself to arc requirements. These machines are fitted with two controls on the output side, one of which controls the amperage and the other the open circuit voltage of the machine. In other words, one control governs the *heat* at the arc and the other gives the type of arc that is required, depending upon whether the operator is welding in the flat position, vertically for overhead, whether deep penetration is required, or whether light gauge materials are being welded. With machines of this type there is no compromise, and the exact output conditions can be obtained, enabling accurate welding conditions to be maintained.

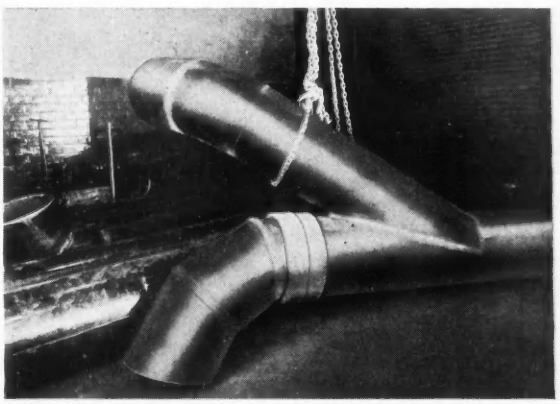
For piping systems, welding probably represents the most economical and most efficient method for pipe installations, repairs and for pipe re-conditioning. Figure 1 shows a 30 degree " Y " Branch, construction of which would have been very complicated if the joints had been threaded. With arc welding, the " Y " is simply six pieces of pipe cut and fused into one integral unit. This " Y " Branch was fabricated in the repair shop at a large gas works and installed in place of a worn junction.

Systematic Tests

Many maintenance departments find it advisable to carry out a systematic programme of leakage tests, inspection and repairs on piping systems, particularly where they are subject to corrosive action or where the pipe is buried in the ground, as the corrosive properties of soils can be very damaging to piping. Ordinary pipe lines carrying liquids can be reconditioned by means of arc welding without interrupting the service of the line. The pipe line is kept operating under normal pressure, avoiding shut-down losses, and also precluding the possibility of gas pockets which might form in an empty or partly filled pipe line. Any pit holes are filled in with weld metal, care being taken not to burn through the pipe. Since the welding arc works quickly and the heat is soon dissipated, there is little risk of burning through.

Where corrosion is very extensive, it is usually advisable to weld on sole plates of new steel, either half way or all the way round the worn pipe. Half soles are cut to the requisite length from new pipe of the same diameter as the piping under repair, or are rolled to proper shape from steel plate. These half soles are then clamped and tack welded into place. The clamp is then removed and the half sole is lap welded around all seams, providing a joint that is permanently tight. If there are leaks in the old pipe through which liquid is escaping, a gasket may be placed over the hole and the half sole plate is then fitted over the gasket and welded in place.

With the increased use of chrome nickel alloy steels in the chemical industry, welding is frequently called upon to effect repairs on chrome nickel steel equipment. Most generally used of this type of steel is the " 18-8," and its most important property is resistance to corrosion. Such alloys represent the cheapest types of alloy which offer ample resistance to attack under some of the commonest and most active conditions. The 18-8 chrome nickel alloys are readily weldable, but when heated in the range between 500° and 1,400° F., they undergo a structural change which is detrimental to their corrosion-resistant properties, though their mechanical properties are not affected to any appreciable extent. The cause of this defect is thought to be carbide precipitation at the grain boundaries, and the type of corrosion then likely to occur is commonly known as inter-granular corrosion. Various methods of reducing or preventing inter-granular corrosion have been devised. Complete immunity can be obtained by heat treatment, but this is usually impracticable on maintenance work. A more recent development of a method of preventing this carbide precipitation during the welding of 18-8 steels, is the addition of an alloying element in the coating of the electrode. The correct electrode to use for this work is one having a core wire of the 18-8 alloy steel type and containing columbium in the coating. Columbium is effective in preventing this condition and is not lost in the welding operation. As well as the 18-8 chrome nickel steels, the 25-12 group is commonly welded, in which case a 25-12 electrode is used of a similar type.



[By courtesy of the Lincoln Electric Co., Ltd.

Fig. 1. 30° Y-branch constructed of six pieces of pipe, cut and fused into one unit.

Welding of Stainless-clad Steel

Stainless-clad steel was developed to retain the corrosion-resistant properties of the so-called stainless steels, but at a reduced cost. Since mild steel normally comprises 80 per cent. of the total thickness of these chrome-nickel-clad steels, the heat is dissipated more rapidly than would be the case with the same kind of solid stainless steel sheets or plates, because of the relatively higher heat conductivity of mild steel. This natural advantage, combined with the low carbon content of the stainless surface, eliminates in practically all

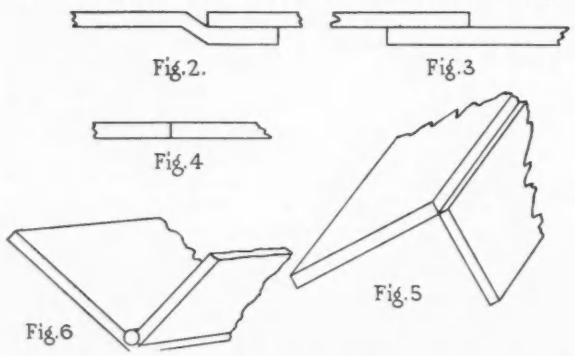
cases, the necessity for heat treatment after welding. Welding is done from the stainless side first, with a stainless steel electrode of the same type as the cladding, and welding is then completed on the mild steel side with a mild steel shielded-arc electrode.

Nickel clad steel plate is welded in much the same manner as stainless-clad steel. The thermal conductivity and co-efficient of expansion of the nickel and the steel are nearly identical. Joints in nickel-clad steel are made by welding the nickel side first, with a welding electrode having a nickel core wire and then welding the steel plate afterwards from the other side with a shielded-arc mild steel electrode.

Chemical vessels are now being lined with stainless-clad sheet linings to prevent corrosion and rusting. This is a very simple method of applying stainless steel to the interior of large vessels. The success in welding thin sheets vertically to form a tank lining is dependent upon the natural characteristics of the 18-8 stainless steel and the low-carbon steel in combination. 18-8 stainless steel melts at a lower temperature than low-carbon steel and has a lower heat conductivity than low-carbon steel. Therefore the very fluid molten stainless steel weld metal would not solidify immediately on being deposited by the metallic arc, if it were not for the superior heat conductivity of the low-carbon steel backing, which acts effectively as a chill. These natural advantages permit ideal welding conditions and dependable welds are made, even if fit-up conditions are not ideal.

Stainless-clad sheet linings may be fitted to riveted tanks, as well as inside tanks of welded construction, and also to concrete storage bins and silos. Joints between two pieces of the stainless-clad lining are effected by means of a lap joint. It is generally not necessary to preform the sheets, as they can be pushed into position immediately, being usually of 16 Gauge material.

Galvanised sheets of 16 to 22 Gauge are usually welded by the carbon arc process. The method is to use a carbon electrode and to feed filler metal into the arc. A 5/32 in carbon is used and is held in a special holder. An integral

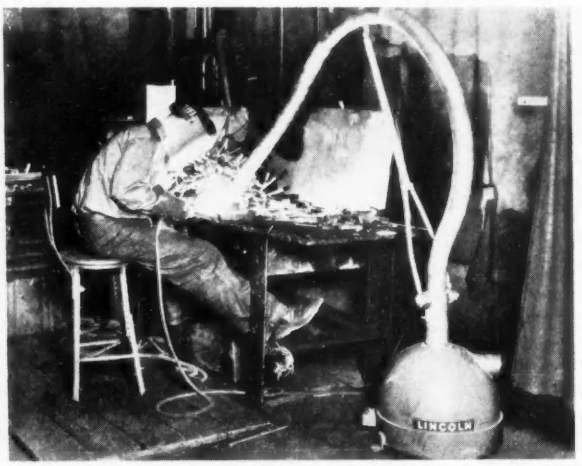


Types of joint in galvanised steel sheets welded by the carbon arc process.

part of this holder consists of a copper coil, through which the carbon is placed. The current flowing through this copper coil sets up a magnetic field, which tends to neutralise the magnetic field set up by the current passing through the carbon and this has the effect of stabilising the arc. The filler metal used is a copper-silicon-manganese alloy such as Everdur. A very short arc is held and the arc is played upon the filler metal and not upon the galvanised sheet. Extremely smooth welds will result.

Some types of joint weld better with this method than others. The order of preference with joints in galvanised sheet is as follows:—(1) Offset lap joint (Fig. 2); (2) Lap joint (Fig. 3); (3) Butt joint (Fig. 4); (4) Outside corner joint (Fig. 5); (5) Inside fillet (Fig. 6).

With the offset lap joint, the weld metal flows very readily and, furthermore, this type of joint acts as a stiffener reducing warping to a considerable extent. Carbon arc welding of galvanised sheet results in a joint of high physical characteristics and corrosion-resistant properties equal to gal-



[By courtesy of the Lincoln Electric Co., Ltd.

Fig. 7. Type of air-conditioner used to take fumes away from welder when at work inside tanks. The welder here depicted is welding galvanised steel, and the air-conditioner is removing fumes from the arc.

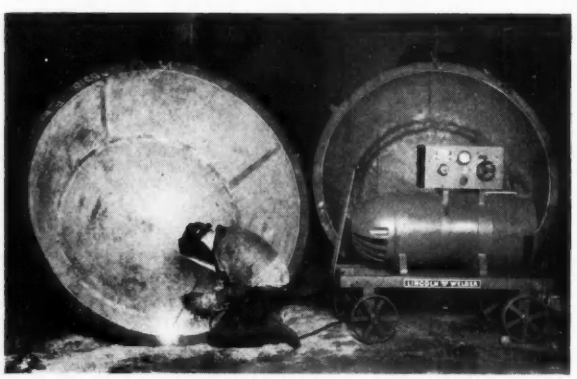
vanised sheet. For welding 14 Gauge galvanised sheet and heavier, a mild steel shielded-arc electrode is used and the procedure is the same as for welding mild steel sheet.

In welding these galvanised sheets, the burning zinc gives off a certain amount of fumes and, for this work, some form of air conditioning is frequently used, as shown in Fig. 7. This air conditioner consists of a flexible tube placed close to the arc. In the hemispherical box is an electric motor equipped with a filter. Air conditioners of this nature are frequently used in the chemical industry, not only for galvanised applications, but more often where a welder is working inside a tank or in an enclosed space, or where he is engaged on maintenance work on oil-soaked or dirty metals.

Welding of Copper

Copper is welded by using a suitable shielded-arc metallic electrode, and it can also be welded with carbon arc and filler rod. Fig. 8 shows two copper cooking vessels for a paint and varnish factory being welded by carbon arc. The operator is holding a carbon electrode in his right hand and a filler wire of copper in his left hand.

On light copper sections, it is not usually necessary to pre-



[By courtesy of the Lincoln Electric Co., Ltd.

Fig. 8. Welding copper cooking vessels for a paint and varnish works. Carbon arc and filler rod are in use, and a head-shield allows the welder to have both hands free.

heat, but owing to the high heat conductivity of copper, some preheating is necessary on heavy sections. On maintenance work, when copper vessels are being patched or copper pipes repaired, preheating is often effected by using a carbon electrode with negative polarity and rapidly moving the carbon arc over the area to be welded. The composition of the filler

metal varies according to the physical requirements of the finished structure. If the weld must have low electrical resistance, the filler metal may be of pure copper or cadmium copper. In cases where electrical or thermal conductivity is not essential, but where only ductility and strength are required, the filler metal may be Everdur, silicon copper or 10 per cent. tin phosphor bronze.

Steam- or moisture-producing fluxes must be kept away from the arc, because of the readiness with which molten copper absorbs hydrogen. For metallic arc welding, a phosphor bronze type shielded-arc electrode is usually employed.

Welding of Aluminium

Pure aluminium and various aluminium alloys can be welded with either a metallic or a carbon arc. For metallic arc welding, a heavily coated electrode of 5 per cent. silicon-aluminium alloy is frequently used. The electrode coating is designed to dissolve any aluminium oxide that may be formed during the welding process.

The high melting rate on most aluminium electrodes necessitates rapid welding and sometimes makes it difficult to get sufficient heat into the work, particularly on maintenance jobs.

To supply sufficient heat and eliminate the tendency to porosity along the line of fusion, it may be necessary to preheat slightly. Specific applications must be studied carefully and welding procedure modified in accordance with the quality of weld desired, the fit-up, and the rate of dissipation of heat into the product being repaired. The arc should be directed so that both edges of the joint to be welded are properly and uniformly heated. Final cleaning can be accomplished easily by chipping off the excess slag and then soaking the weld in hot 3 per cent. nitric acid solution or 10 per cent. sulphuric acid solution for a short time, finally rinsing with hot water.

Hard Surfacing

Most metals can be deposited by the electric arc to give a wear-resisting surface. In chemical plant one of the most frequent applications for hard surfacing is building up worn and corroded valves. When high-pressure steam valves become unfit for use by the action of steam eating away the threads, they are frequently repaired by machining out the old threads, depositing new hard-facing metal with the electric arc and then machining this deposited metal and cutting new threads. Repairs of this type cost only a fraction of the price of a new valve.

Valves made of corrosion-resisting steel are built up with stainless steel electrode and, in fact, some valves of this nature are now manufactured from ordinary mild steel and surfaced with stainless steel by deposition through the electric arc. This gives a very much less expensive valve and when the surface layer of weld metal is corroded, a new layer is built up. Mixer blades in chemical plant and mixer rolls are common hard-surfacing applications, frequently built up, employed in chemical works.

MAINTENANCE OF EVAPORATORS AND DRIERS

By

BRIAN N. REAVELL, B.Sc., A.C.G.I.

EVAPORATION is usually considered as describing the concentration of a liquid by boiling, whereas drying may be defined as almost complete removal of a liquid from a solid or solution. The two operations are, however, similar in that they necessitate the application of heat in some form or other. For the successful operation of evaporating or drying plants it is therefore most important to make sure that the heat supply is used to its full advantage. The commonest source of heat is steam, both for evaporation and drying, but for the latter process heaters operated by fuel oil, gas, or coal are frequently used.

It is obvious that the maintenance requirements of evaporators and driers will largely depend upon the type and make, but there are certain common principles to be considered. A material that has to be evaporated is almost without exception in direct contact with a metallic surface through which heat is conducted. Driers are in some cases the same but in other instances the material to be dried is warmed up by hot air. Considering firstly evaporators and driers in which the material does come in contact with a hot metallic surface, we can include jacketed pans, tubular evaporators, hot plate driers, trough driers, drum driers, etc. The efficiency of all these plants depends on the way in which the steam is presented to the metal surface on one side and the behaviour of the material on the other side of the metal plate. The steam supply must be adequate and not saturated with water. Condensate formed in the steam space must be drained away continuously to prevent blanketing of the heating surface. All air and entrained gas must be allowed to escape from the jackets. To ensure these conditions the steam supply pipe to the plant should be well lagged, and if it is a long distance from the boiler, a drain pipe and steam trap carried from the lowest point in the line near to the evaporator or drier will take away any condensate from the steam before it enters the plant. Attention to the steam trap taking the condensate from the plant is well worth while. If the trap is not lifting properly it allows condensate to collect in the steam space and loss of output occurs, and if it is jammed open live steam will blow away with consequent wastage. The effective removal of air and non-condensing vapours from the jacket or steam space is sometimes overlooked by plant manufacturers, but even if this point has not been properly studied in the design of the plant it is sometimes possible to make improvements on site by fitting small bleed-off valves at the highest level of the jacket and as remote from the steam inlet connection as possible. The bleed-off valves should be adjusted when running to give a wisp of steam blowing off continuously. Attempts at steam economy by shutting off these valves only result in an appreciable loss of output from the plant.

Having made sure that the steam is being presented to the metallic surface in the best possible way consistent with the design of plant, we can now examine the conditions existing on the other side of the metal wall. For evaporating plants the material is always liquid, and to obtain the highest rate of heat transfer between the liquid and the metal wall it is essential that the liquid should be moving as fast as possible. Furthermore, the metal surface must be clean. The movement of liquid is caused either by convection, e.g., with boiling pans and basket tube evaporators, or by forced circulation, with pumps, agitators, etc., or in long tube evaporators by high-speed climbing film. Little can be done to affect the rate of movement of liquid except where forced circulation is used. In this case the condition of the pumps should be carefully checked and they should be properly overhauled to give the full output. If not already existing, a pressure gauge should be fitted to the delivery side of the pump and after overhaul the gauge-reading noted when normal working conditions are established. If the pressure is found to drop subsequently it indicates at once that the pump requires overhaul.

The heating of the material in a drying plant is equally

dependent on the movement of the material across the hot metal surface, but such a variety of means is employed for providing movement of the material that no general remarks can be applied, but rabble-arms, lifters, stirrers, rakes, etc., must be kept in good repair.

The importance of a clean heating surface cannot be overstressed and every available means for scraping and descaling should be studied. The rate at which scale and crust will form depends on the type of evaporator or drier and on the material being processed. Evaporators handling brine solutions, milk, and highly scaling liquids may require descaling every day, but when, for example, a fruit juice is being concentrated, a well-designed evaporator will run for months without serious scaling. It is a matter of economics to decide how often the surfaces should be cleaned or descaled on any drier or evaporator. Time and labour cost in cleaning must be balanced against the increase in output effected by the better heat transfer obtained.

Drying plant in which the material is heated by means of hot air or flue gas is generally used for granular solids, or pastes and slurries, and not for liquid containing solids or solutions. Of this type the rotary drier and the cabinet or cupboard drier are most common. The distribution of the hot air among the material to be dried is of great importance. In rotary driers the maintenance is largely a matter of mechanical upkeep. So long as the volume of air or flue gas is kept at the correct figure and the heater is operating correctly, little work is required. It should be remembered that it is false economy to run the drier with worn rollers and tracks as the rate of wear is rapidly increased as soon as the pathway becomes pitted and rough.

Cabinet driers are made in very many designs. In some types the air is heated by steam pipes disposed at the bottom and sides of the drier. Circulation of the air is by convection and it is difficult to distribute the flow of hot air uniformly across each of the trays, the tendency being to get excessive heating on the lower and top trays and less in the middle. This gives a slow overall rate of heating and tends to over-dry some of the material. The installation of a fan in a suitable position can frequently increase the output considerably because of the better distribution of heat so obtained and the improved rate of heat transfer. Where the air is circulated over the heating tubes and trays in a closed circuit there is a danger of the air picking up dust from the trays and depositing it on the heating tubes, thus appreciably reducing the air temperature and capaciy of the plant. It is therefore important to keep the tubes clean externally. The cabinet drier has a large surface area in relation to its drying capacity so that heat losses by radiation may be an appreciable amount of the total heat consumpion. It is therefore essential to keep the lagging of the chamber walls in good condition.

Spray Driers

Spray driers can be classed with rotary driers in that the material is brought in direct contact with hot air or flue gas. The drying time is very short, as the finely atomised particles lose their moisture content almost immediaely they reach the zone of hot air. But unless the atomiser is in good condition, some large particles or droplets will occur and they will not dry properly, appearing as wet patches in the mass of dry powder leaving the plant. Maintenance of the atomiser must therefore be a first consideration in these plants. Where centrifugal atomisers are used, the gearing and drive should be kept in good condition and the atomising wheel, or disc, rebalanced if it should become worn or corroded. Pressure-jet atomisers require frequent attention to maintain the jets in proper condition because of the erosion caused by the extremely high liquid velocity passing through the jets. Any worn jet should be replaced immediately and the liquid feed pump kept in perfect condition, as the operation of these atomisers depends on a steady high pressure.

It is impossible in this article to deal with the maintenance of evaporating and drying plant auxiliaries and equipment, but it is as well to mention that unless these items are in good condition the performance of the plant is bound to be upset. This applies particularly to the pumps and condensers on vacuum evaporators and the air heaters and fuel burners on rotary, cabinet and spray driers.

Regular observations of plant performance should be recorded and when a falling off in capacity is noted the cause should be determined at once. If it is found that a trouble is repeatedly occurring through makeshift repairs to a faulty part or through a definite weakness in design, consultation with the plant maker will usually result in overcoming the difficulty. On the other hand serious breakdowns are often due to insufficient routine attention being paid to the plant, and the cure is to be found in better organisation of the maintenance staff work. In small concerns this may appear to be a difficult matter because of the necessarily limited number of men capable of undertaking such work; but if records of plant performance are kept regularly, as suggested above, and from this information a programme of routine maintenance duties is laid out it will materially reduce the time wasted in executing major repairs.

Phosphate in Germany

Serious Deficiency Reported

THOUGH Germany is the leading world producer of potash and nitrogen, the deficiency of native phosphate supplies constitutes the major national economic problem of German agriculture. Germany's present situation with respect to phosphate supplies is described in American consular reports as being worse than in 1914 because of insufficient consumption during recent years, when every effort was made to increase cultivation, consequently depleting the amount of phosphoric acid in the soil.

Despite the fact that total consumption of phosphatic fertiliser has increased in recent years, rising from 470,800 metric tons P_2O_5 in 1933-34 to 690,300 tons in 1937-38 (in the Old Reich, excluding Austria and other annexed territories), this increase has been far from sufficient to meet the national requirements and is considerably less than the rate of increase recorded in the consumption of nitrogen and potash fertilisers. While from 1933-34 to 1937-38 consumption of phosphoric acid expanded by about 45 per cent., potash showed a gain of 60 per cent., and nitrogen of 65 per cent. Experts estimate that, compared with actual consumption of 690,300 metric tons P_2O_5 in 1937-38, requirements actually amount (in the Old Reich) to over 1,000,000 metric tons.

Basic slag supplies the greater part of the national phosphoric acid consumption, in 1937-38 accounting for 457,800 metric tons of the national consumption of 690,300 tons, superphosphate and phosphate in mixed fertilisers supplying the remainder of 232,500 tons. Moreover, the most marked increase in consumption has been recorded for basic slag, showing a gain of 141,500 metric tons P_2O_5 from 1933-34 to 1937-38, compared with only 78,000 metric tons recorded for superphosphate and phosphate mixtures. The supply of basic slag is obtained from two sources: domestic steel plants and imports. Germany's output of basic slag (Old Reich) rose from 533,000 metric tons in 1932 to 2,312,000 tons in 1937; it was chiefly owing to this augmented domestic supply, occurring as corollary of the increased production of steel, that it was possible to raise the national consumption of phosphate fertilisers. In contrast, imports of basic slag dropped from 1,013,000 metric tons in 1933 to only 396,000 tons in 1938. At present the possibilities of importing substantial quantities of basic slag are poor and the prospect of an increased domestic yield appears unlikely, thanks to difficulties of expanding the steel output above existing levels.

Imports of phosphate rock, including apatite, rose steadily from 408,000 metric tons in 1932 to 1,050,000 tons in 1936-38. From about 8 to 15 per cent. of Germany's total imports during 1936-38 was represented by apatite from the U.S.S.R.; but although this source accounted for 152,000 tons of crude phosphate in 1938, imports during the first seven months of 1939 were only 8,160 metric tons.

FROM A WORKS MAINTENANCE NOTE-BOOK

MAINTENANCE has many aspects, for chemical plant is no longer a mere assembly of tanks, pipes and valves, with possibly a pump to move liquid and an agitator to assist in mixing operations, as well as simple means for heating and cooling. Indeed, it is no matter which may be treated lightly. In some cases it can be so vital that the safety of the plant, as well as efficient working, absolutely depends upon it. Those members of the works staff who are entrusted with maintenance must be regarded as highly responsible persons. The efficiency with which they discharge their duties is reflected in the cost at which a definite range of chemicals can be produced, in the absence of accidents at the works, and in the annual cost of repairs and such replacements as are due to exceptional conditions of corrosion and mechanical wear.

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Irrespective of whether the works be large or small, there is a definite place in its daily routine for someone in charge of maintenance in an executive capacity; the number of persons actually engaged under his direction will depend upon the size of the works and the nature of the processes which are carried on. Sometimes there are maintenance aspects of a highly specialised nature, as in the case of plant working under high pressure, or for the more common aspect of a boiler house for production of steam for heating and power purposes. Each individual aspect of this subject calls for careful attention, and the results over a period of years are to be correlated with the successful history of the works from the point of view of prosperity. It is only by noting the accumulated details of what is done and why it is done, and of how the necessity was either suspected or indicated, that works and works' engineers may profit mutually.

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The exchange of ideas for better, safer and more efficient working in processes of a chemical nature is a matter that must be fostered as much as is humanly possible. There must be an outlook quite distinct from the one so often found in the chemical industry, where the details of operating a process with no protection from the patent laws are rigidly guarded and there is great reluctance on the part of the manufacturer of a product to refer to even the barest detail of works operation and management. It is only by the continuous interchange of ideas and practices that the chemical and allied works which provide for one of the basic industries of this country, and of the world at large, may derive the greatest benefit from their individual interests.

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The need for maintenance in its general aspect, especially as regards tanks and reaction vessels, is greatly reduced by using the correct metal for constructional purposes. If steel is indicated, just the right type of steel must be used. Steels for the construction of plant and equipment are many and varied—high tensile, corrosion-resisting, heat-resisting, creep-resisting. Some of the corrosion-resisting steels find important applications in nitric acid plant, from aspects of both manufacture and storage. The 18-8 chrome nickel steels, with the addition of special elements in small amounts to avoid intercrystalline corrosion, are almost unaffected by any strength of cold nitric acid, but where high concentrations are in use at temperatures close to boiling point some attack becomes apparent. The same steels also find a limited field of application in phosphoric acid plant, but here—with an eye on maintenance—it is desirable to know what percentages of other acids are present in small amounts before a particular steel can be safely recommended up to some limit of concentration and temperature. The addition of molybdenum to 18-8 chrome nickel steel, to the extent of 2.5 per cent., affords great improvement in the resistance offered to phosphoric acid solutions at boiling point. In fertiliser manufacture the utility of the 18-8 chrome nickel steels is determined by the free acidity of the product and the temperature involved, but the use of such steels can do much to lower the cost of upkeep for evaporators and whizzer baskets handling ammonium sulphate.

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Stainless-clad steels save up to 45 per cent. in material costs and can be as fully corrosion-resisting as solid steel of the stainless type. This clad steel will be found to give better heat conductivity than much of the stainless steel that is available, with freedom from the so-called "hot spots," so that when it is used for the construction of heating vessels there is a resultant decrease in fuel costs and assurance that a uniform temperature will be attained throughout the batch. Clad steel, however, must be chosen with care in order to obtain a firm weld which is free from oxide and shows no tendency for carbon to migrate from the mild steel base to the stainless cladding. Only by taking this precaution can it be assured that the cladding will never lose its corrosion resistance, and that the fabricated vessel will withstand the temperature and vacuum stresses to which it may be subjected. The commonly adopted test of severely twisting a sample of clad steel to reveal any tendency for the cladding and base to separate is not sufficient to warrant its adoption; welding tests must be applied under actual conditions of use.

* * * *

Nuts and bolts, set-screws and washers, made of non-rusting metal may mean added initial cost, but the saving that can be made in time and labour is not to be disregarded from aspects of maintenance. Brass, bronze, copper, Monel, Everdur and other alloys are available, as well as stainless steel. Just that refinement of adopting non-rusting nuts and bolts is quickly reflected in the time sheets of the maintenance staff. Manholes and inspection doors are more readily opened and replaced; breakdowns, making it necessary to put in a spare part, can be remedied more quickly without loss of processing time and the accumulation or lack of material at different places in the process flow sheet, which is inevitable where one unit in the chain of equipment fails to carry out its normal operation to schedule time.

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Power-transmission belting made of rubber has several advantages in comparison with leather belting. It is less liable to take a permanent stretch, and the coefficient of friction is higher; in addition, the rubber belting generally is cheaper than leather belting. With regard to maintenance it must be kept in mind that the exposure of rubber belting to acid fumes can have serious results, even if only affecting the efficiency with which power can be transmitted, and an acid-resisting protective layer must be provided.

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Mastic asphalt is an ideal material to provide for a jointless, liquor-proof floor covering. Such a floor will remain in good condition for many years if the material is properly laid and correctly mixed. This mastic asphalt, as a manufactured article, has a higher bitumen content than the natural rock asphalt and is obtainable in acid-resisting grades suitable for flooring as well as for the lining of tanks. Granite chippings are generally incorporated as a filler to offer resistance against superimposed weight and mechanical wear and tear. Under heavy use wear and tear are much reduced by providing wide-flange wheels for trucks, and table feet that will not cause indentations upon the surface of the floor; generally, by avoiding local stress concentrations. In the matter of maintenance such floors should be washed down frequently to prevent the accumulation of corrosive liquors, which can easily cause the floor surface to disintegrate if allowed to remain and if traffic is heavy.

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Fan casings must be opened at regular intervals for inspection and cleaning. The frequency with which this is done will naturally depend upon the process served and the extent to which corrosion or deposits are to be expected, but in no case should the maximum interval between successive inspections exceed six months. In cases where corrosion exists

but is not sufficient to warrant the use of special material for the fan blades, it will be found that a periodic coating of red lead will greatly reduce the risk of deterioration. When the fan casing is opened for inspection there is adequate opportunity to scrape the blades as well as the interior of the fan casing itself, and then give both a coating of red lead. The inspection of the blades for signs of corrosion must be done thoroughly, as the breaking of a blade can cause damage much more severe than a mere distortion of the fan casing. Where fans are installed in duplicate to avoid delays in plant operation due to a breakdown, it is desirable that the fans be run alternately for periods of one week; by this means each fan is kept in good working order and may instantly be started up should the other one fail. As fans usually run at high speed there is considerable wear at the bearings and these should receive constant attention to ensure tightness.

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A considerable amount of power is lost when the bearings on a line of shafting get out of perfect alignment owing to the wear that has taken place in the bushed bearings and also to slight movement of brackets and hangers. It is desirable to test the alignment every year and make any necessary adjustment without delay.

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Waste of steam by leakage can seriously affect the cost of production, or alternatively reduce profits. Such a leakage may take place at steam traps, as well as at defective joints on steam pipes and at valves. Defective joints in pipework should be remedied as soon as the plant has been shut down for the day and the steam can be turned off. Any leakage on a main will make it necessary to turn off the steam at the crown head, as an attempt to tighten nuts or studs while a main is under pressure can risk a serious accident. Valves not in regular use should be tested once a day to ensure that they will be in working order when needed. The inconvenience or serious trouble that may arise if such a valve cannot be opened or closed when required cannot be indicated in the absence of stating the precise conditions applicable to each case. Steam traps will waste large quantities of steam if they are defective. They should be examined daily without fail to ascertain their efficiency of working. In perfect working order a trap will discharge hot water only; evidence of steam indicates that the trap needs adjustment or repair. Spare traps should never be lacking in the works store; in the absence of a spare, part of the plant may have to be put out of operation while repairs are effected, unless the condensate can be discharged by hand as a temporary measure. This is not always convenient, and most certainly it is not efficient even for a short period in the day's run.

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Maintenance is not a matter to be disregarded in the care of plant made of aluminium, if that plant is to work at the high degree of efficiency that can be claimed for the use of aluminium metal. Scale should never be removed by the aid of sharp pointed tools; neither should workmen be permitted to enter aluminium tanks when wearing nailed boots, as the resulting deep scratches easily become the starting point for local corrosion. For the same reason aluminium plant should not be cleaned, either internally or externally, with a drastic abrasive such as sand or coarse steel wool. Fine steel wool provides the best cleaning agent; copper wool must be rigidly avoided. Where cooling water circulates through aluminium condensers and tanks containing aluminium cooling coils, a supply of water carrying any appreciable amount of iron oxide must never be used, as iron rust in contact with aluminium will fairly quickly set up a progressive attack which it is difficult to stop.

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Inefficient cooling is invariably due to scale from hard water, or to a film of mud from dirty river water. Careful check on inlet and outlet temperatures of water serving condensers should soon indicate the need of descaling. Temperature data obtained in this way will also point out possible wastage of water by temperature differences being low, when measurement of the quantity of water passing will speedily show that the condenser is not being operated at its maximum efficiency. Where large quantities of water are metered for payment to a local authority this waste—for waste it is—may be serious from the point of view of cost, and if the water has to be pumped there is added power wastage.

A Practicable Alternative Fuel

Expert Opinion on Producer Gas

PROVIDED suitable equipment and fuels are used producer gas can be regarded as a practicable alternative fuel for motor vehicles according to conclusions reached by the committee on the Emergency Conversion of Motor Vehicles to Producer Gas.

A general account of the research work which the committee has supervised and an illustrated description of a producer and trailer unit designed by them is contained in a report (H.M. Stationery Office, 9d.) issued this week by the committee, the chairman of which is Sir Harold Hartley.

The report states that the producer plant designed by the committee may be regarded as satisfactory in operation with low volatile anthracite and certain low temperature cokes. The plant was designed for vehicles having a gross laden weight of six tons with engine capacities of 3-4 litres. The use of the producer on a trailer would generally obviate the complications and costs arising from mounting the producer direct on the vehicle, but the method to be preferred is dependent upon individual circumstances. The use of an effective gas filtration system is essential. The committee has obtained good results using sisal tow, and also oiled coke followed by sisal tow, as filtering media. It is difficult to estimate accurately the overall costs of operation with producer gas, as these are affected by such diverse factors as loss of power, possible loss of loading space, and extra cost of servicing. Actual fuel costs under present conditions should be appreciably less than with petrol.

It is of the utmost importance that producers should not be used with unsuitable fuels. The suitable fuels at present available are low-volatile anthracite and certain low-temperature cokes. The position regarding availability of fuel is that :—

(a) Sufficient anthracite for several thousand vehicles can be made available at short notice; but the quantities of specially dried fuel, which is not, however, required for the emergency producer, are very limited.

(b) The addition to (a) of the low-temperature coke which it should be possible to make available without undue disturbance of existing markets, and if certain plant were installed at low-temperature works, should provide sufficient fuel for nearly 10,000 vehicles.

(c) In any period of vital emergency larger quantities of fuel could probably be diverted for use with producers should the national interest demand this.

(d) There is reason to hope that the potential fuel supply will be largely increased by the addition of certain types of coke, should experiments fulfil their present promise.

EXEMPTION FROM K.I.D.

The Treasury have made Orders under Section 10(5) of the Finance Act, 1926, as amended by Section 2(1) of the Import Duties (Emergency Provisions) Act, 1939, exempting certain articles from Key Industry Duty from February 7, viz.: aniline and phthalic anhydride until June 30, 1940, and certain metallic residues, containing sodium molybdate and/or sodium vanadate, until December 31, 1940. Copies of the Orders, which are entitled "The Safeguarding of Industries (Exemption) (Nos. 1, 2 and 3) Orders, 1940," may be obtained from H.M. Stationery Office.

Chemical Matters in Parliament

Substitute Fuels

IN the House of Commons last week Sir R. Gower asked the Secretary for Mines whether, to encourage the production in this country of further alternative fuels, he proposed to take any additional steps during the war period to stimulate the production of sludge-gas or methane for industrial purposes.

Mr. Lloyd replied that he could assure Sir R. Gower that the importance of sewage gas (methane) as an alternative fuel was fully recognised by his Department, and the question of its production and utilisation for that purpose was being actively considered.

Mr. W. R. Duckworth asked the Secretary for Mines whether, to stimulate the production in this country of further alternative fuels, he proposed to take any additional steps during the war period to encourage the extraction of benzol from gasworks.

Mr. Lloyd: I hope shortly to be in a position to make a statement on this and related subjects.

Scientific Workers

Captain Plugge asked the Minister of Labour whether he was aware that up to the outbreak of war many articles of a scientific character were still imported from Germany, and that arrangements had now to be made by the British industries concerned to make up as rapidly as possible for the consequent shortage of supplies; and whether, in view of the necessity of releasing a certain number of men from the Forces for this purpose, he would, in consultation with the three Defence Departments and the Ministry of Supply, take steps to ensure this.

Mr. E. Brown replied that the matter was under constant review by Departments concerned, and arrangements were made so far as possible to adjust to the best advantage the several demands for the services of the men concerned.

Chemical Engineer's Business

Colonel Wedgwood asked the Home Secretary whether his attention had been called to the delay in allowing Dr. Rudolf Schulhof, chemical engineer, to start work in a business in which he had invested £1,000 to help textile exports to markets he used to supply from Czecho-Slovakia; what was the reason for the delay, and would permission soon be granted for him to start work.

In reply Sir J. Anderson stated that he was very sorry for the delay which had occurred in this case, but he was causing immediate inquiries to be made, and he hoped to be in a position to communicate his decision to the right hon. Member in the course of a few days.

Molasses Import

Mr. R. Gibson asked the Chancellor of the Duchy of Lancaster whether he was aware of the dissatisfaction owing to the fact that sugar refineries at Greenock were allowed to work short-time, while molasses, available for use as raw material in these refineries was diverted for manufacture into non-food-producing products; and what steps he intended to take to prevent such diversion.

Mr. Lennox-Boyd replied that he was aware that there was a possibility that the sugar refineries at Greenock might have to work short time owing to the necessity for rationing sugar. Imported molasses were mostly unsuitable for refining into sugar and were as a general rule required for industrial purposes. He feared that it was impracticable to increase the supply of sugar at the present time.

Mr. Gibson: Will the Minister answer that part of the question which deals with the diverting of molasses to the manufacture of non-food-producing products.

Mr. Lennox-Boyd: As I have said, they are being used for industrial purposes. The molasses contain such a low sugar content that they would be of very little use in meeting the hon. Member's need.

Fair Treatment of Scientific Workers

M.P.'s Support New Committee

A MEETING of the recently-formed Parliamentary and Scientific Committee took place at the House of Commons on Wednesday of last week. In the absence of the chairman, Captain L. F. Plugge, M.P., the chair was taken by Major H. A. Procter, M.P., and among those present were Mr. W. R. Diamond, Dr. J. Vargas Eyre of the Distillers Company, Mrs. R. Fremlin of the Association of Scientific Workers, Mr. W. F. Higgs, M.P., Mr. Henry Haslam, M.P., Professor B. W. Holman of the Royal School of Mines, Mr. O. J. R. Howarth (representing Professor Allan Ferguson of the British Association), Dr. J. O. Cutter of the Oil and Colour Chemists' Association, Mr. R. H. Morgan, M.P., Mr. S. F. Markham, M.P., Mr. R. F. Maitland of the Institution of Structural Engineers, Mr. Richard B. Pilcher of the Institute of Chemistry and Dr. W. R. Woolridge of the London School of Hygiene and Tropical Medicine.

It was announced that the following bodies have now definitely agreed to support the committee:—Association of Scientific Workers; Institute of Chemistry; British Association of Chemists; National Veterinary Medical Association; Institution of Structural Engineers; Institution of Marine Engineers; British Association for the Advancement of Science; Institution of Mechanical Engineers; Pharmaceutical Society of Great Britain; Institute of Fuel; Institution of Gas Engineers; Thames Barrage Association; Oil and Colour Chemists Association; Institution of the Rubber Industry; Association of Applied Biologists; Universities' Federation for Animal Welfare. The names of a number of Members of Parliament who have agreed to become members of the committee were announced also.

It was agreed to give all possible support to affiliated scientific and technical bodies in ensuring fair treatment for scientific and technical workers in connection with Military Service, not only so far as the list of reserved occupations is concerned, but also with a view to ensuring that the special qualifications of scientific and technical workers enrolled in the fighting services should be properly appreciated and developed.

Lectures at Leeds

Special Course on Fuel Chemistry

THE University of Leeds has arranged a programme of special courses in the Department of Coal Gas and Fuel Industries with Metallurgy, consisting of a number of lectures to be delivered during February and March. On the Manufacture of Coal Gas a course of twelve lectures divided into three sections is provided: Section A (Carbonisation Practice) was served by four lectures given by Mr. R. Dally, Chief Chemist, British Gas Light Co., Ltd., Hull, on February 5 and 12 at 2 and 3.30 p.m.; in Section B (Water Gas Practice) Dr. F. J. Dent, Research Chemist, Joint Research Committee of the Gas Research Board and the University of Leeds, will give two lectures on February 19, at 2 and 3.30 p.m.; while Section C (Gas Purification Practice) will have six lectures, at the same hours, on February 26 and March 4 and 11, given by Dr. H. Hollings, Chief Gas Chemist, Gas Light and Coke Co., London. The last series will be of particular interest to industrial chemists, as it deals largely with the extraction of impurities—ammonia, hydrogen sulphide, hydrocyanic acid—the removal of naphthalene, and the recovery of benzol and toluol.

Mr. A. L. Roberts, Ph.D., A.I.C., is dealing with Refractory Materials on March 5; Dr. A. Key is speaking on March 12 on the Disposal of Waste Liquors from Gas Works and Coke Ovens; and Mr. A. Preece is lecturing on the Failure of Metals under Service Conditions, on February 27. Each of these subjects will be covered by two lectures, at 2 and 3.30 p.m. on the dates mentioned.

Treating Lead-Mine Effluents

Solution of a Westmorland Problem

CONSIDERABLE public interest has been aroused lately in the effluents discharged by the Glenridding lead mines in Westmorland. An obviously milky effluent has been passing from the crushing mills down the steep stream, and flowing into Ullswater. In conjunction with the Friends of the Lake District, Prof. W. C. M. Lewis, of Liverpool University, undertook investigations last summer, and found that there was a serious problem in the fine suffocating silt which remained suspended in the turbid effluent. The actual solid mass of the milky material is presumably very small, but it has been sufficient to produce a cloudiness in the lake, in conjunction with the very considerable total solid mass of coarse or granular material discharged at the same time. It is interesting to note, however, that Dr. W. Rushton, the biologist whom the Friends of the Lake District also took into consultation, reported that there was no real menace to fish life from the lead content of the effluent.

It was apparent that the methods then in use by the mining company were not adequate. The chemical examination of the solid materials by Mr. W. J. Occleshaw showed that there was but a small amount of lead in these, and that the process of separating the lead ore had a high efficiency. A considerable proportion of crushed silica was discovered by Professor Lewis to be present in the suspension. He found, too, that samples taken from the mine outflow, merely on standing for 24 hours, deposited all suspended matter, and became practically clear water. Others from the outflow of the settling tank after treatment deposited all the more granular matter, but were not so clear as the first. The mixture used by the firm was allowing 40 per cent. of the total mineral solids entering the settling tank to escape, and this was carried to the very steep stream and so into the lake. Much of the trouble was due to the inadequate time allowed in the settling tank.

Laboratory Results

From laboratory experiments, several important and practical factors indicating a remedy have emerged.

"We have found," said Professor Lewis, "that addition of ferric chloride and alkali (even soda ash), so as to produce a flocculent precipitate of ferric hydroxide in the tube containing the milky suspension, *carried down the milkiness completely*, leaving the upper aqueous layer quite transparent. . . . Trials were carried out with alginic acid—a technical extract from sea-weed. This material is insoluble in water, but dissolves in alkali where it is presumably present as sodium alginate, i.e., the alginic portion is negatively charged. On adding a small quantity of 2 per cent. solution of sodium alginate to a typical sample of rather thick liquor no effect could be detected. . . . On now adding a small quantity of an acid such as hydrochloric, the alginate was converted into alginic acid, which formed a copious white and somewhat granular precipitate which on the laboratory scale flocculated rapidly and carried down with it all the suspended matter, leaving a perfectly clear liquid above."

This process appeared to be appreciably faster than the analogous one involving the production of ferric hydroxide. Whatever reagents are used, the settling process obviously requires time and the use of two tanks at least. Not only would the fine suspension be removed, but the coarse as well, for the latter is a potential source of the cloudiness.

Settling Tanks Installed

The manager of the Glenridding lead mine has now announced that the firm has arranged for two concrete settling tanks, 12 ft. by 10 ft. by 6 ft., to deal with the silt from the crushing mill. The water first passes through a disk filter and then through a drum filter before entering the settling tanks, and the effluent, it is hoped, will be the "absolutely clear water," which the firm has aimed at as the ideal.

F.B.I. and War Risks Insurance

Month's Cover without Extra Payment

IN a letter to the Board of Trade on premiums to be charged under Part II of the War Risks (Commodities) Insurance Act, the F.B.I. strongly urges that for one month, starting from March 3 next, the existing amounts at risk should be covered without payment of any additional premium.

It is pointed out that, when the scheme was inaugurated last September, at a time when immediate claims upon the fund were contemplated, it was considered sufficient to establish a fund equal to 30s. per cent. for the three-month period September 3 to December 2. Yet, by March 3, the date on which the next period begins, a fund will have been created equal to 35s. per cent. on the value of stocks insured. In these circumstances, the F.B.I. feels that the cash resources of industry need not be further depleted by a call for additional premiums, though it fully recognises that, in the event of severe damage, the existing fund may have to be increased.

The Federation further draws the attention of the Board of Trade to the fact that confusion has arisen from the ruling that, where a contract is for work, labour, and materials rather than for a sale of goods, the goods required for carrying out the contract are not insurable under the Act. To remove the prevailing uncertainty, the Federation suggests that the Act should be amended to provide that, whether or not the contract includes an element of service, commodities should be insurable up to the time of delivery to the site (under a constructional contract) or to the customer in other cases, except when ownership has passed earlier to the purchasers. This would not affect goods excluded from the Act by order of the Board of Trade, or such work as constructional contracts which are now outside its scope.

German Lubricating Oil

Long Period in Service

AN interesting sidelight on the German economic machine is provided by the examination, which has recently been made, of the lubricating oil present in a German aeroplane that had been shot down by our fighters. The sample of oil was examined in the general manner for used lubricating oils, and comparison made with an oil taken from a British machine after eighty hours' running. The following figures were obtained:—

	Oil ex German machine	Oil ex British machine
Viscosity at 140° F. sec. Redwood I.	344	365
Dilution per cent.	2.5	0.7
Insol. 60/80 spirit per cent.	2.161	0.711
Insol., but soluble in benzene per cent. (asphaltic)	0.12	0.08
Ash per cent.	0.424	0.142
Water per cent.	0.15	0.1
Specific gravity at 60° F.	0.901	0.894

The ash consisted mainly of lead oxide with some iron and aluminium oxides. Quantities of lead halide (probably bromide) were extracted by hot water from the oil, as is normal for lubricating oils from engines running on ethylised fuel. The basic oil had approximately the viscosity required by D.T.D. 109 Summer Grade, and also a high viscosity index. It had apparently been compounded with approximately 2 per cent. of fatty oil (probably voltolised type, or possibly neatsfoot).

From the high percentage of insoluble material, the appreciable amount of asphaltic bodies, and the considerable dilution with heavy fractions of the fuel used, comparison with the British oil indicates that the oil had been in circulation for a long period, certainly more than 100 hours. Its condition was considerably worse than is usual for a used British aircraft oil even just prior to discarding.—*Pharm. J.* (February 3, 1940), *144*, 3.979, 70.

Ketones and the Production of Aviation Spirit

Fermentation Processes for Acetone

WITH an anti-knock rating of about 60 (iso-octane being taken as the standard at 100), ordinary petrol is far from being the most efficient fuel for modern high compression engines. Military aircraft call for a fuel with an octane number of 100-120 and are likely to demand even more efficient fuels in the near future. The octane number of ordinary petrol can be brought up to the desired figure by the use of iso-octane itself, lead tetraethyl (or other anti-knock catalyst), isopropyl ether or a lower aliphatic ketone (preferably acetone). Several factories in the U.S.A. are turning out iso-octane (trimethylpentane) on a large scale with the aid of the ample supplies of di-isobutylene derived from cracked petroleum hydrocarbons. Its octane value can be increased to 120 with the aid of lead tetraethyl.

In the United States again, isopropyl ether is readily obtainable from the propylene of natural gas by oxidation. In the pure state it is equivalent to iso-octane in octane value and is also considerably improved by lead tetraethyl. An alternative route to isopropyl ether is by hydrogenation of acetone to isopropyl alcohol and dehydration of the latter to the ether, good yields being secured at each stage in this process by using appropriate catalysts.

In French practice, according to Ch. Berthelot (Chimie et Industrie, Nov., 1939, 779), acetone (octane number 120) is mixed with an equal amount of petrol, with or without the addition of lead tetraethyl, so as to form a spirit with an octane value of 100. Acetone is probably the cheapest anti-knock fuel now available, several processes being in operation both in Europe and America. In the latter country petroleum has developed into an important source of supply in recent years, the general principle consisting in catalytic hydration to secondary alcohols of the olefines formed in cracking operations and catalytic oxidation of the alcohol to the corresponding ketone. Isopropyl alcohol is thus derived from propylene and converted into acetone, *e.g.*, by passage over a copper-zinc alloy at a temperature of 340-480° C. (U.S. Pat. 1,952,702 of Shell Development Company).

The fermentation processes for acetone manufacturue are more suitable to European conditions, although agricultural waste material in the United States is sufficiently plentiful to enable them to flourish side by side with those based upon petroleum products. The original Weizmann process employed *Bacillus butylicus* in the fermentation of a maize mash to a mixture of acetone and butyl alcohol during the last war, whereas the organism now more generally used is *Clostridium acetobutylicum*. The maize, or other amylaceous material, in the form of an 8 per cent. pulp, is brought to a temperature of 37.5° C. and a *p*H of 4.3 before inoculation with the organism, which must be freshly prepared. Fermentation is complete after 2 to 3 days and can be directed to give a higher yield of acetone by adding some acetic acid to the pulp from the moment when fermentation begins to accelerate.

Acetic acid, readily produced by oxidation of acetylene, is another convenient starting point for acetone. In a process of the Canadian Electroproducts Company, acetic acid vapours are contacted with a magnesia catalyst mass in steel tubes so as to produce acetone in 95 per cent. yield under optimum temperature conditions. Recent patents of the Holzverkohlungsindustrie A.G. claim the oxidation of acetylene directly to acetone with the aid of a catalyst composed of iron oxide, manganese dioxide and barium carbonate. More recently still, the same concern reports a 90 per cent. yield of acetone by passing mixed vapours of acetylene and alcohol together with water vapour over spongy iron containing 3 per cent. manganese dioxide at 470° C. A considerable amount of acetone is also made from ethyl alcohol, one of the catalysts for which process is understood to be a mixture of reduced iron oxide (or metallic iron) with weak alkali.

Advisory Council on Scientific Research

Extensive Programme in Hand

THE Advisory Council on Scientific Research and Technical Development which met for the first time last week has, according to its chairman, Lord Cadman, an extensive research programme before it which includes more than 1,000 items for investigation.

Lord Cadman stated that the variety of problems in hand was striking, ranging from the most exacting chemical work in the explosives section to the most refined physical research in the communications section. It was therefore essential to have a council membership of not less than 25 and to have many committees of the council on which outside scientists also would serve.

With the impetus which it was hoped the council would give to military research they would, no doubt, have some proposals of a major character. It was expected that the committees would recommend changes in existing researches, both in nature and the financial provision needed for them. The Ministry of Supply, Directorate of Scientific Research, had a personnel of about 900, but even so there was plenty of ability outside the permanent staff capable of helping and willing to do so. The directorate was so constituted that advantage could be taken at any time of outside facilities and outside personnel could be engaged for investigatory work. Such services would be paid for.

Colonel J. J. Llewellin, who opened the meeting in the absence through illness of Mr. Burgin, said the Ministry of Supply already had a very extensive Directorate of Scientific Research which served all three Defence departments. The Ministry had also been able to supplement the resources of the directorate with extensive assistance from research laboratories in universities and in industry. The Advisory Council would be the senior advisory body of the Ministry upon all matters of pure and applied science. The Ministry looked upon the council not only to help to make weapons superior to those of the enemy and to indicate efficient antidotes to any "secret" war weapons we may have to meet, but also to assist if possible in the development of new processes of rapid production. It was hoped, too, that the council might be able to assist in the appropriate utilisation and conservation of raw materials and the discovery of substitutes for materials wherever that might be desirable.

Letters to the Editor

Training Britain's Youth

SIR,—Lord Derby and others have emphasised the importance of useful occupation being provided for the years immediately preceding the age at which a young man will normally report for National Service, a time when the keenest of them are eager to have probationary experience of the work which they intend to do in life.

The important bearing of this difficult problem upon the country's future export trade will be apparent, and with the intention of assisting in its solution the Dunlop Rubber Company has formulated a training scheme which it is proposed to introduce almost immediately. The training will aim to provide for selected young men a commercial background which will be useful to them when the war is over and their military or other service ended.

The number who can be trained by any one industrial organisation is necessarily limited, and it therefore occurs to me that other national or international undertakings may be willing to consider the adoption of some such plan for the well-being of the individual and the nation.

To any such the Dunlop Company will readily furnish details of its own proposals.—Yours faithfully,

GEORGE BEHARRELL,
Chairman, Dunlop Rubber Co., Ltd.

London, S.W.1. January 27.

Personal Notes

MR. L. C. S. LEWSEY has been appointed chairman of the Association of Makers of Coated Papers for 1940 COLONEL R. G. RITSON has been elected vice-president.

* * * *

PROFESSOR A. V. HILL, Secretary of the Royal Society, was nominated on Monday as Parliamentary candidate (Independent Conservative) for Cambridge University for the vacancy caused by the death of Sir John Withers. Polling will take place on February 19-23 and the result will be declared on February 24.

* * * *

LORD SUFFOLK has been appointed liaison officer in Paris between the Director of Scientific Research (Ministry of Supply) and French scientists. Lord Suffolk has an expert knowledge of explosives, and is interested in other scientific problems. French scientists are at present visiting this country at the invitation of the Ministry of Supply, and a permanent French mission will arrive shortly to undertake work here similar to that of Lord Suffolk in Paris.

* * * *

PROFESSOR HARRY MCCORMACK, director of chemical engineering at the Armour Institute of Technology, was recently elected president of the Illinois Engineering Council. Professor McCormack has for many years been a member of the committee on legislation of the American Institute of Chemical Engineers. He is also a member of the American Chemical Society, American Institute of Chemical Engineers, and chairman of the laboratory committee of the chemical engineering division of the Society for the Promotion of Engineering Education.

* * * *

The King has approved the grant of the medal of the Order of the British Empire, Civil Division, for Gallantry (E.G.M.) to MR. L. F. O'HAGEN, MR. S. W. SEWELL, and MR. W. G. SYLVESTER, explosive workers at the Royal Gunpowder Factory, Waltham Abbey, for their steadfastness in remaining at their posts after the explosion of January 18. Mr. Sylvester was engaged in purifying nitroglycerine in a washing-house within 100 yards of the explosion. Hot water and air services were cut off and more than a ton of nitroglycerine was exposed to the risk of freezing and detonation. Messrs. O'Hagen and Sewell, 150 yards from the centre of the explosion, were engaged on the nitration of glycerine, and here also hot water and air services were broken off, and more than 1,000 lb. of the material remained in a dangerous state of instability for some hours. By their courage and discipline all three workers prevented the spread of the explosion and saved the lives of their fellow-workers.

* * * *

The following are members of the new export council which, it was announced last week, is to be set up by the Board of Trade to assist in the organisation of the country's export effort:—SIR CLIVE BAILLIEU, chairman of the National Smelting Co., Ltd., and director of other companies, including the Dunlop Rubber Co., and British Metal Corporation; MR. R. S. BEALE, chairman of Guest Keen and Nettlefolds and a director of Richard Thomas; MR. JOHN BROWN, general secretary, Iron and Steel Trades Confederation; MR. F. D'ARCY COOPER, chairman of Lever Brothers & Unilever, Ltd.; MR. EDWIN FISHER, chairman of Barclays Bank, Ltd.; MR. M. HODGSON, secretary of Boilermakers' Society; LORD HYNDLEY, commercial adviser to the Mines Department and chairman of Stephenson Clarke and associated companies and a director of the Bank of England; SIR CECIL WEIR, chairman of the Export Trade Committee of the Association of British Chambers of Commerce; LORD STAMP (adviser on economic co-ordination); SIR FREDERICK PHILLIPS (Treasury); SIR FREDERICK LEITH-ROSS (Ministry of Economic Warfare); MR. W. PALMER (director-general of raw materials, Ministry of Supply); and the controllers or deputy-controllers of cotton and wool, and, when required, a representative of the Foreign Office. The President of the Board of Trade, SIR ANDREW RAE DUNCAN, will preside.

Cement Clinker

Mechanism of Formation in Rotary Kiln

THE results of researches on the mechanism of formation of cement clinker in a rotary kiln, in both the dry and wet process, are reported by Yoshii (J.S.C.I. Jap. Suppl. Bdg., 1939, *42*, 9, 304-313B).

Microscopic and X-ray examinations were made in various parts of the kiln. In the conversion region, it was found that the field composition could be completely described by reference to the amount of three materials—"alite" or $3CaO.SiO_2$; "belite" or α and $\beta/2CaO.SiO_2$; and "celite," which is a glass.

In the dry process, no reaction occurs during the long preheating zone, and the first chemical change to take place is the dissociation of limestone and the formation of free lime. There is quite a considerable zone in which lime is found co-existing with clay and quartz, no reaction taking place between them. Belite is the first compound to be formed, gradually displacing the lime, but leaving some quartz unaffected. Then alite nuclei are observed, and the complete disappearance of the free lime is thereby considerably hastened. The final change to take place, in the clinkering zone itself, is the conversion of belite to alite, along with the removal of the last traces of free lime and the formation of some celite. The ratio alite/ belite/ celite in the final clinker is 63.8/ 25.0/11.2. In the wet process, somewhat similar actions occur, the final alite/belite/celite ratio being 67.6/21.8/10.8.

PETROL RESISTING PAINT

Air Ministry Material Specification D.T.D. 400, dealing with Petrol Resisting Paint, demands that the material shall consist of a spirit resin varnish pigmented with red oxide of iron to B.S. Specification 2D28, and that two coats of the material applied at normal temperatures to a smooth metal surface to give when dry a film weight not exceeding 2.5 ozs./sq. yd., shall form a uniformly smooth covering. Methods for determination of the rate of drying, and tests for bending, protection against corrosion, and resistance to benzol are described in four appendices, together with diagrams of apparatus for determining flexibility and hardness. The keeping qualities of the material shall be such that when stored in the original sealed containers, the material shall retain its properties in accordance with the above requirements for not less than twelve months in temperature climates, and six months in tropical climates. Copies of the Specification can be obtained from H.M. Stationery Office, or through any bookseller, price 1s. (1s. 1d. post free).

TRADING WITH THE ENEMY

The schedule to the Trading with the Enemy (Specified Persons) (Amendment) No. 4 Order, 1939, has been varied by the Board of Trade to include the names of the following concerns:—Coloranil S.A., Bucarest, Roumania; Continental Caoutchouc and Gutta-Percha Co., Amsterdam, Holland; Internationale Gesellschaft der Stickstoff Industrie, A.G., Basle, Switzerland; Internationale Gesellschaft für Chemische Unternehmungen A.G. (I.G. Chemie) or Société Internationale pour Entreprises Chimiques S.A. (I.G. Chemie), Basle, Switzerland; Quimica Schering, S.A., Caracas, Venezuela; Weskott and Co. La Quimica "Bayer," Caracas, Venezuela.

TITANIUM OXIDE IMPORTS into the Netherlands increased from 391 metric tons (187,000 guilders) for the first 10 months of 1938 to 566 tons (273,000 guilders) during the same period of 1939. Of this total, Germany sent 490 metric tons, while most of the rest came from France. Titanium white also advanced from 185 metric tons (52,000 guilders) to 338 tons (94,000 guilders) for the 10 month period of 1939, Germany supplying practically the entire amount.

Sir Gilbert Morgan

The Life-Work of a Great Research Chemist

CHEMISTRY, both on the industrial and on the research side, has suffered a great loss in the death of Sir Gilbert Morgan, who died in hospital at Richmond, Surrey, on January 31. Professor Sir Gilbert Thomas Morgan, Director of Chemical Research from 1927 to 1938 under the Department of Scientific and Industrial Research, was one of the greatest research chemists of the century. Over and above his scientific ability, he possessed the qualification, invaluable to a teacher and to a director of scientific institutions, of being able to inspire enthusiasm in his pupils and fellow-workers.

Morgan received his first training in science at the Central Foundation School of London, at the time when Dr. Richard Wormell was headmaster. While at school he won the Holl Scholarship to Finsbury Technical College, where he remained for three years. For the first two years at Finsbury he attended the usual college courses in chemistry, physics and engineering, and in the third year did chemical research in Professor Meldola's private laboratory, where the now famous work on diazoamino compounds was being carried on, with F. W. Streatfield. Morgan temporarily forsook academic life, however, being appointed research and works chemist to Read Holliday and Sons, Ltd., the Huddersfield colour manufacturers, a position for which he was recommended by Professor Meldola. After five years' industrial experience he again returned to more scholastic pursuits in 1894 as a national scholar at the Royal College of Science, Kensington. Here he gained the diploma of associateship of the college and the B.Sc. degree of London University, both with first class honours in chemistry. He was then appointed to the college staff under Sir William Tilden, and, after promotion through the stages of demonstrator and lecturer, became Assistant Professor in 1908. His work here included further studies of the diazo reaction, the preparation of organic arsenicals and antimonials, and the examination of coumarin compounds.

Appointment to the D.S.I.R.

In 1912 he was promoted to full professorial rank on his appointment as Professor of Chemistry at the Royal College of Science for Ireland, Dublin, in succession to Sir Walter Hartley. His work on the co-ordination compounds of the rarer metals was interrupted by the war, and he returned to England in 1916 to succeed Dr. Meldola as Professor of Applied Chemistry at Finsbury Technical College. He left Finsbury in 1919 on being appointed to the Mason Chair of Chemistry in the University of Birmingham, and remained there until 1926, when he accepted the post of Superintendent in the Department of Scientific and Industrial Research. In Birmingham he devoted attention to the chemical constitution of the lakes of mordant dyes, largely in collaboration with Dr. J. O. Main Smith. At the D.S.I.R. he took a leading part in the organisation of the new chemical laboratory at Teddington, being promoted Director of Chemical Research in 1927. During the construction of the laboratory he started an investigation, with Mr. A. A. Drummond, on the phenol-formaldehyde resins. Under Sir Gilbert's directorship the Laboratory made great progress; the scope of the work undertaken widened considerably, and the scientific staff were encouraged to tackle long-range problems without regard to their immediate utility. His own researches on coal-tar intermediates and high-pressure chemistry proved of enormous value. He always maintained that in the province of industrial chemistry, pure chemistry and engineering were mutually indispensable. On retiring from the Directorship of Chemical Research in 1938, be became chairman of the Research Fund Committee of the Institute of Brewing.

During a long career as a research worker, Sir Gilbert Morgan was a prolific contributor to chemical literature. He published no less than 350 original papers, either independently or with collaborators, on a wide variety of subjects in pure and applied chemistry, together with three chemical treatises:—"Organic Compounds of Arsenic and Antimony" (1916); "Inorganic Chemistry: A Survey of Modern Developments" (with F. H. Burstall, 1936); and "British Chemical Industry: its Rise and Development" (with D. D. Pratt, 1938). He was also editor of the chemical section of the 14th edition of the "Encyclopædia Britannica" and editor of the Journal, and other publications, of the Chemical Society from 1902 to 1906.

Sir Gilbert Morgan.

His work brought him many honours. In addition to the degrees of D.Sc. (London) and M.Sc. (Birmingham), he was awarded the honorary degrees of LL.D. (Birmingham and St. Andrews) and Sc.D. (Dublin). He was elected a Fellow of the Royal Society in 1915 and an honorary member of the Society of Public Analysts and other Analytical Chemists in 1934. At one time or another he has occupied the presidential chair of many of the important scientific organisations. Thus, he was President of the British Association of Chemists from 1926 to 1928, President of Section B (Chemistry) of the British Association for the Advancement of Science in 1930, President of the Society of Chemical Industry from 1931 to 1932, President of the Chemical Society from 1933 to 1935, and President of the Institute of the Plastics Industry from 1935 to 1937. He was a fellow of the London City and Guilds Institute, an honorary associate of the Manchester College of Technology, and a corresponding member of the Royal Dublin Society. His services to the country were recognised by his knighthood in 1936.

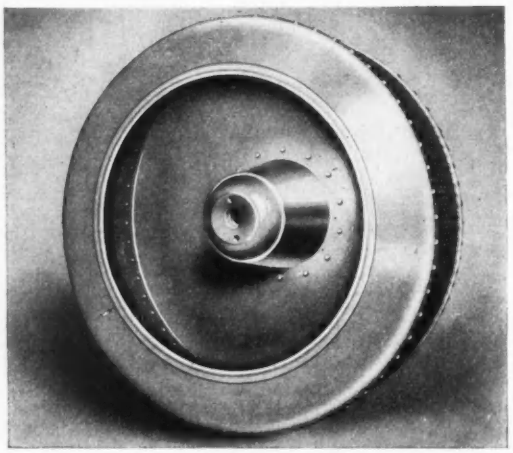
Perhaps his most valued honour was the award of the Medal of the Society of Chemical Industry in July last; the characteristically modest address, delivered on receipt of the medal at Exeter—only the other day, it seems—with its constant references to his fellow-workers throughout a long and honourable career, was typical of a man whose life and work accord with the highest traditions of chemical science.

An interesting sidelight on Sir Gilbert Morgan's career was provided in a letter from Sir Francis Fremantle published in *The Times* on February 6. Sir Gilbert's father was butler at Sir Francis's home at Essendon, and lived on in the village till his death a few years ago; his wife, Sir Gilbert's mother, was a Swiss ladies' maid. Young Morgan went to Essendon village school and it was with a little kindly help from the rector that his foot was set on the first rung of the educational ladder at Finsbury Technical College.

The funeral of Sir Gilbert Morgan took place at Golders Green Crematorium on Tuesday. The Rev. W. I. Bulman officiated. Members of the family were present as well as a large gathering representative of the manifold scientific, academic, and technical interests with which Sir Gilbert had identified himself.

Recent Trade Literature

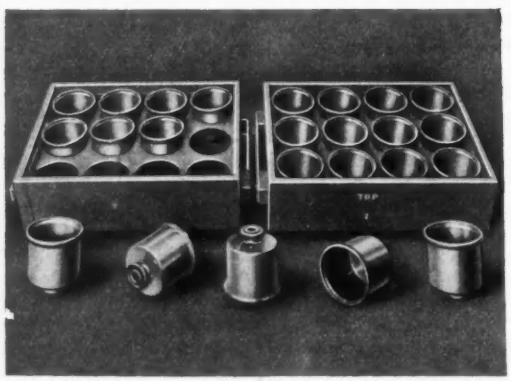
For many years PRODORITE, LTD., of Eagle Works, Wednesbury, have concentrated on problems of acid-proofing, and this firm is known throughout the whole country as chemical engineers and consulting contractors. They have spent many



Hydro Extractor Basket, 3ft. 6in. diameter, lined throughout with Lithcote

thousands of pounds on research work and their acid-proofing service is amongst the most perfect of its kind. They specialise in acid-proof flooring, acid-proof tanks and tank linings and have done important work for various Government departments as well as for most of the large industrial concerns in Great Britain. Their Cement Prodor, which is used in conjunction with these acid-proofing schemes, is the finest acid-proof cement obtainable and is fully equal in every respect to the famous German Hoechst Cement. Messrs. Prodorite's activities in these respects are so well known that we will not enlarge upon them here but we should like to mention their latest interest in the acid-proofing field.

They have recently acquired from Newton Chambers and Co., Ltd., of Thorncliffe, Sheffield, the manufacturing rights for Lithcote, a lasting protective lining and coating for metal plant for the chemical industry and for textiles, also for the plating and de-scaling trades. Lithcote is a type of non-vitreous baking enamel, developed from a process of American origin. It is a synthetic lining and coating which can be applied to any metal surface. It is processed and bonded to the prepared face of any metal by a special baking



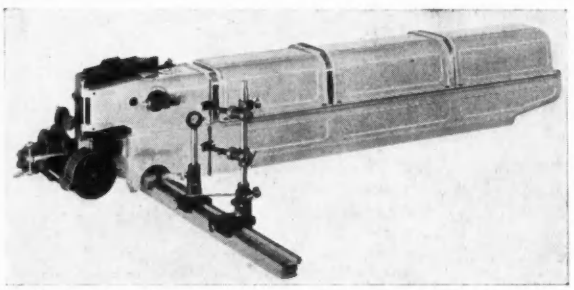
Spinning Pots for the Rayon trade lined with Lithcote

process and it gives a hard, smooth, glass-like, non-chipping, flexible, acid-proof, corrosion-proof, solvent-proof, durable surface. It will resist most acid processes, solvents, brines, alcohol, fats, oils, syrups, petroleum, acid-fumes, spray, steam and acid processes for textiles, and acid dye solutions. Lithcote linings impart no trace of odour or taste to sensitive products whose purity must be unquestionable, and they are entirely free from poisonous matter.

The accompanying illustrations are included in Messrs. Prodorite's latest folder, which summarises in handy form the performance and advantages of Lithcote.

THE BENJAMIN ELECTRIC, LTD., have issued another interesting booklet featuring the necessity of employing good lighting in factories and workshops. It is emphasised that, at the present time, particularly good lighting is essential in order to solve the many problems involved in achieving a satisfactory output. It is stated that it is not sufficient just to flood the room with so much general lighting which would spread an even illumination over an empty area. Machinery, fixtures and the workers themselves will interfere with this lighting. The lighting must be designed to suit the particular works, and every Benjamin lighting specification does, it is claimed, cater specially for this requirement. A folder describing a new unbreakable lamp shade, the "White Coolicon," has also been issued by the company.

The tenth edition (abridged) of "Spectrographic Outfits for Metallurgical and General Chemical Analyses" has been issued by ADAM HILGER, LTD. In this abridged edition the full lists of recommended outfits are included but no descriptions of the apparatus itself, except for recent and important improvements, will be found. For this and for advice on the



A fully automatic large quartz spectrograph which is among the instruments described in "Spectrographic Outfits," published by Adam Hilger, Ltd.

choice of equipment for various purposes reference must be made to the complete edition. The early pages of the complete edition of "Spectrographic Outfits" contain advice on the general choice of spectrographic equipment and illustrated descriptions of the four principal types of spectrograph available. There are also descriptions of apparatus for routine quantitative analysis. A useful addition is a complete specification for a spectrochemical laboratory accompanied by a dimensional plan of what may be considered an ideal laboratory.

A. GALLENKAMP AND CO., LTD., have issued an attractively designed card informing those interested in laboratory porcelain that they will be pleased to send them a complete list of the Royal Doulton range. They state that large stocks are always available and the Potteries are continually fulfilling special orders.

The Weldor's Stabilizer, published in America by the LINCOLN ELECTRIC CO. in the interests of welding operators, differs in a novel way from the usual type of literature issued by manufacturers. Of the twenty-two pages of the publication, nearly twenty are devoted to letters and articles from welding operators the world over. These communications contain personal news about the writers themselves, details of specific welding operations carried out by them, their views on welding matters in general, and other items of interest. The majority of the letters are illustrated by snapshots of welding achievements, views of the particular country in which the writer is working, etc.

The current issue of *Deco Trefoil,* published by the DENVER EQUIPMENT CO., states that the company has developed a portable placer unit incorporating the Denver Mineral Jig as the principal item for recovery of values from alluvial deposits. The placer unit can be used for the concentration of gold and black sands from auriferous deposits and also for the recovery of other heavy minerals, such as tin, tungsten, platinum, or metallic sulphides.

THE POWER GAS CORPORATION, LTD., in collaboration with WURSTER AND SANGER, Inc., Chicago, U.S.A., have issued a new leaflet dealing with equipment for the soap, glycerine, oil and fat industries. Various types of plant are described and illustrated including those for soap lye, and sweetwater evaporation in single, double and multiple effects, crude, dynamite, and C.P. glycerine production, fat splitting by Twitchell and Autoclave processes, fatty acid distillation, oil hydrogenation and hardening, the refining, bleaching and deodorising of edible oils, and production of hydrogen.

In the first war-time issue of their *Information Bulletin* GEORGE KENT, LTD., announce that they hope to be able to continue publication of the journal at regular intervals and to include items of news relating to their war-time activities They state that at present they are fortunate in having on their books a large number of orders for meters and instruments. In the sphere of A.R.P., protection is afforded to all employees of the company in the form of concrete shelters which were completed before war started and, as befits a firm of instrument makers, tests were carried out on the physical conditions in one of these shelters when fully occupied. A brief description of these tests is reproduced in the Bulletin, which also contains details of recent orders of special interest received by the company.

The fourth issue of "Tin and Its Uses," the quarterly review issued by the INTERNATIONAL TIN RESEARCH AND DEVELOPMENT COUNCIL, announces a new "white-bronze" plating which, it is claimed, out-rivals chromium in its resistance to tarnish and is almost identical in colour and reflecting power to perfectly polished silver. Photographs are reproduced which illustrate the brilliance and other attractive qualities of this new finish on spoons, taps, metal tea-sets and car fittings, and it is suggested that it will also find extensive applications in reflectors for optical instruments, headlamps, etc., unbreakable shaving mirrors, shop fittings, and many other ornamental metal wares. Thick and adherent tin linings can now be applied to large pieces of apparatus used in the food industry, the review states, as a result of recent improvements in electroplating technique. These thick linings are far more serviceable than the old hot-dipped coatings. Still another application of electro-deposited tin is as a coating on metal surfaces in rubbing contact, such as pistons and piston-rings and bearing surfaces. The tin not only improves lubrication but also eliminates abrasion during running-in processes.

A 60-page condensed catalogue, just issued by the LEEDS & NORTHRUP CO., Philadelphia, U.S.A., lists the entire Leeds & Northrup line of instruments for research and for routine testing in laboratory, plant and field, including standards, galvanometers and dynamometers, bridges, potentiometers, photometric apparatus, miscellaneous apparatus, primary elements, accessories, supplies and instrument parts. Every standard L. & N. item is briefly described, and most of the principal ones are illustrated. For more complete descriptions and much supplementary information, the reader is referred to more detailed L. & N. publications. However, in choosing instruments and accessories for specific work in laboratory, plant or field, many instrument users will find this catalogue a useful guide.

The importance of avoiding bad lighting in offices and workshops is emphasised by RESTLIGHT, LTD., in a recent brochure which illustrates the advantages of Restlight filters for use with ordinary electric light. It is maintained that ordinary artificial light is injurious—the eye-strain it causes is often the cause of headaches, irritability, lassitude, and consequent ill-health and debility. A weak light is harmful, unpleasant and intolerable, and a bright light is often just as injurious. A Restlight filter it is claimed absorbs all harmful excess of red ray; in other words it "corrects" artificial light by balancing the spectrum. Details are given also of industrial models of the Lamplough matching lamp which is described as a reliable medium for colour matching and the ideal lighting for intricate work of every description.

To show some of the specialised temperature measuring problems to which "Rayotube" detectors are now being applied, the LEEDS AND NORTHRUP COMPANY, Philadelphia, U.S.A., have just issued a 40-page catalogue entitled "Micromax and Speedomax Rayotube Pyrometers." It describes applications for "Rayotubes" in detecting temperatures of work in motion. It shows "Rayotubes" sighting directly on many important surfaces—on the underside of open-hearth roofs; on the lining of rotary kilns; on the retort of spiral-retort furnaces. It shows them mounted at forge-furnaces; at continuous ceramic kilns; at beehive kilns; at soaking pits; at open-hearth checker-chambers, etc. Diagrams indicate the various methods of applying these detectors and actual-size colour reproductions of chart-records illustrate the features of Micromax and Speedomax instruments which "Rayotubes" now make available to many new applications.

General News——From Week to Week

MESSRS. SPENCER, CHAPMAN & MESSEL, LTD., announce that from to-day their temporary address will be: 23 Grange Road, Sutton, Surrey (Tel. Vigilant 1195).

OXFORD UNIVERSITY has received a £6,000 grant from Imperial Chemical Industries, Ltd., towards the equipment and completion of the Dyson Perrins Laboratory extension. The grant is spread over a period of seven years.

WITH THE FIRST NUMBER of Volume XIX, our contemporary, *Fuel in Science and Practice,* enters a new phase. It is now the recognised research journal of the Institute of Fuel, but it maintains an independent policy, and will continue to circulate information about the composition and properties of fuels of all kinds, forming the necessary bridge between the academic aspect of the problems involved and the practical requirements of the fuel technologist. The recent death of Professor R. V. Wheeler, one of the original editors, must needs be keenly felt, but if the present number is any guide, the contents of the journal show no falling off in informativeness or breadth of interest.

OWING TO THE continual expansion of business the C. L. Burdick Manufacturing Co., Ltd., is removing to larger premises at 6-8 Amwell Street, London, E.C.1. (Telephone Terminus 7123-4). The factory and office will be at the new address from February 26.

THE ANNUAL TRADE REVIEW of the *Yorkshire Post and Leeds Mercury,* and the Annual Business Review of the *Manchester Guardian* both contain, as might be expected, interesting articles on the present state of the chemical industry. The former is by Dr. W. H. Coates, Director of I.C.I., the latter by Mr. J. Davidson Pratt, general manager and secretary of the A.B.C.M. It is cheering to note that each reports a period of full production, following the trade recession of 1937 and early 1938, and makes a favourable diagnosis of the war-time condition of the industry. Mr. Pratt further remarks, "the export trade is not being allowed to take second place to normal home consumption. Every effort is being made to maintain and develop the export markets, and notable advances have already been made in many markets where Germany has been predominant in the past."

MESSRS. STEEL CONSTRUCTION CO., LTD., Whitegates Engineering Works, Motherwell, have been admitted to membership of the Glasgow Chamber of Commerce.

WE HAVE RECEIVED THIS WEEK the first number of the new monthly journal, *War Savings*—which succeeds its forerunner, *National Savings*—and is to be a link between all persons and all districts of the National Savings Movement. Mr. Collin Brooks has been invited to act as director of the journal and has taken charge of a Press Office for the rapid distribution of news about the movement. In a message to readers he requests that all news about what is being done to stimulate National Savings should be sent to him, at Bouverie House, Fleet Street, E.C.4, or to the Editor, " War Savings," Sanctuary Buildings, Westminster, S.W.1.

THE ACCOUNTING OFFICER of the Land Fertility (Research) Fund reports a balance of £17,189 10s. 5d. carried forward from the year ending March 31, 1939. Receipts totalled £29,362 7s. 6d., of which £4,143 0s. 10d. represents the balance brought forward from the previous year, and £25,042 0s. 5d. was collected from producers of lime and occupiers of agricultural land in respect of lime and basic slag. Practically all the payments are accounted for by grants to Institutions for advisory and local investigation work, including £9,574 3s. to colleges and research stations in England and Wales and £1,631 15s. 4d., to similar establishments in Scotland.

MR. J. W. IVORY, who presided at the annual general meeting of the Seed, Oil, Cake and General Produce Association, held at Liverpool, on January 31, mentioned that the Liverpool Port Area Feeding Stuffs Committee handled about 50 per cent. of the imported oilcakes and meals coming into the whole country. " The initial shortage of material," he said, " now seems to be passing away, and happily the shipments of feeding stuffs in general are increasing, and as the Government now aims at importing about two-thirds of the normal, of which the Liverpool share was about 500,000 tons per annum, some alleviation may be in sight. It was suggested that an effort should be made to increase the membership of the Association (which stands at 355) in order to offset subscriptions which will not be forthcoming from 20 German members.

PROFESSOR M. L. E. OLIPHANT, talking on the subject of " Physics in War " in a public lecture at Birmingham University last Tuesday, stressed the great practical value of academic science in present circumstances. It was upon the academic development of science that went on in England only in universities that future developments in industry depended. It was therefore essential that this country, in order to keep some sort of supremacy in industrial development, should encourage academic research in science. After discussing the ways in which physicists had helped in war work, Professor Oliphant remarked that some of the criticism of the way in which the war was conducted came from men of science. Scientific and technical men complained sometimes that they had not been given any job and that their talents were not being used. Some of that criticism was justified, because there was a tendency in England to allow administrative offices to be filled only by persons with non-technical qualifications. He abhorred the conclusion that was sometimes reached that because a man had technical qualifications he could not discharge administrative duties. Mistakes had happened and would continue to happen if the knowledge of technical people was ignored.

Foreign News

THE ANNUAL REPORT of the Chilean Nitrate and Iodine Sales Corporation covering 1938-1939 shows sales of 891 metric tons of iodine—59 tons more than the previous year. Production of sodium nitrate during the current fiscal year (to June 30, 1939) was about the same as in the previous corresponding period, although exports increased by 2.8 per cent.

A SCHEME FOR THE DISTRIBUTION of fertilisers in Sweden in the coming spring has been approved by a special commission in which the Government, the fertiliser trade and Swedish manufacturers are represented. Farmers in Norrland (North Sweden) are allowed full quotas corresponding to their consumption in the spring of 1939, while farmers in other parts of Sweden have been given permission to purchase up to 40 per cent. of what they consumed last spring, and they will be given additional quotas during the forthcoming months. These rules apply to the sale of superphosphate only. As to the nitrogen fertilisers produced in Sweden, about 50 per cent. of normal requirements has so far been net.

ACCORDING TO THE JOURNAL *Arriba* the production of cellulose in Spain has reached twenty-six per cent. of the country's industrial needs. Results giving satisfactory grounds for optimism have been obtained from the manufacture of cellulose from straw.

THE OUTPUT OF CRUDE AND REFINED TOLUOL in the United States during 1938 totalled 13,021,080 gallons, according to official statistics. From 1929 to 1938, the average production was about 14 million gallons per year. Sales of crude and refined toluol in the U.S.A. during 1938 were 12,884,734 gallons.

ACCORDING TO THE *Svenska Dagbladet* a Swedish Government prospecting commission has located large deposits of sulphur, copper and tin. In present circumstances it will pay to introduce regular tin mining in Sweden with a view to rendering the country less dependent on imports.

THE NEW DYESTUFFS, heliogen blue and heliogen green, have been officially approved in Germany as foodstuff colours in view of their virtual insolubility in acids, alkalies and organic solvents. They are both members of the phthalocyanin family, the first being a copper compound and the second a chlorinated derivative.

THE FULL TEXT of the trade agreement signed between France and Spain on January 18 is published in the French *Journal Officiel* of January 21. The agreement provides, *inter alia*, for the import into France of 431,000 tons of pyrites, 365,000 tons of Riff iron, 672 tons of mercury, 7,000 to 10,000 tons of lead, 21,000 tons of blende, and 200 tons of wolfram, and for the import into Spain of 325,000 tons of phosphates, pharmaceutical products and mineral waters to the value of 30,000,000 francs, dyes to the value of 10,000,000 francs, and other chemical products to the value of 35,000,000 francs. Payments under the agreement will be made by means of the clearing system.

Forthcoming Events

THE NEXT MEETING of the London and District Section of the Institution of the Rubber Industry will be held on February 12, at 7.15 p.m., at the Northumberland Rooms, Northumberland Avenue, W.C.2, when Mr. D. Cairns, Works Secretary of the Dunlop Rubber Co., Ltd., General Rubber Goods Division, will read his paper entitled : " What Is Costing and its Relation to Price Fixing?" Mr. W. S. Chaney, Chairman of the India Rubber Manufacturers' Association's Accountant Experts' Committee, will preside.

THE SECOND EVENING MEETING of the 1939-40 series of The Pharmaceutical Society of Great Britain will be held in the Society's House, 17 Bloomsbury Square, London, W.C.1, on February 13, at 7.30 p.m. A lecture entitled " How do Drugs Act?" will be given by Sir Walter Langdon-Brown, M.A., M.D., D.Sc., F.R.C.P. The Chair will be taken by the President.

THE MANCHESTER AND DISTRICT SECTION of the Institution of the Rubber Industry held their first meeting of the Session on January 22, when Mr. T. Martin, in the chair, announced that on February 19 a paper entitled " Plastics for Electrical Insulation," by Mr. L. Massey, M.Sc., would be read before a meeting held jointly with the Society of Chemical Industry. Also, on March 15, there would be a joint meeting with the Manchester Section of the Society of Dyers and Colourists at which an address would be presented by Dr. J. B. Speakman.

THE COUNCIL OF THE INSTITUTION OF CIVIL ENGINEERS, Great George Street, Westminster, S.W.1, have decided to resume Institution meetings from February 20. Among meetings in the near future of special interest to chemists and chemical engineers are the following : On March 11, at 6 p.m., joint informal meeting with the Institution of Mechanical Engineers and the Institution of Electrical Engineers, at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. " Emergency Repairs, with Special Reference to Welding "; on March 19, at 5.30 p.m., paper on " The Sewage Disposal of Delhi," by J. A. R. Bromage, M.Inst.C.E.

A MEETING OF THE London and S.E. Counties Section of the Institute of Chemistry will take place in the hall of the Royal Society of Tropical Medicine and Hygiene, Manson House, 26 Portland Place, W.1, on February 21, at 5 p.m. A lecture on " The Silicon Hydrides and some of their Simpler Derivatives " will be presented by Dr. H. J. Emeleus, A.R.C.S. The subject deals with the latest researches into the nature of these compounds and the special technique required in work upon them. With these provisions, Italian production of lignite should reach, before the end of 1940, some 2,500,000 tons.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

COATING-COMPOSITIONS.—American Cyanamid Co. (United States, Jan. 21, '39.) 1314.

MANUFACTURE OF FLUORESCENT PAINTS, coatings, etc.—B. B. Technical Industries (Manufacturing), Ltd., J. P. Brennan, and G. Brennan. 1449.

PROCESS FOR MANUFACTURING FIBRES, filaments, etc., from solutions of proteins.—Coöp. Condensfabriek Friesland. (Holland, Jan. 21, '39.) 1122; (Holland, Dec. 23, '39.) 1123.

MANUFACTURE OF ORGANIC COMPOUNDS.—H. Dreyfus. 1084, 1160, 1163.

PRODUCTION OF ALIPHATIC COMPOUNDS.—H Dreyfus. 1161.

MANUFACTURE OF SYNTHETIC RESINS.—E. I. du Pont de Nemours and Co., and J. W. Hill. 1131.

VULCANISATION OF RUBBER.—E. I. du Pont de Nemours and Co., and I. Williams. 1392.

PRODUCTION OF CONCENTRATED SLURRIES OF MAGNESIUM HYDROXIDE.—F. Elkington, and H. H. Chesny. 1336.

MANUFACTURE OF POLYMERIC NITROGENOUS DERIVATIVES.—D. Harrison. 1175, 1176, 1177.

TREATMENT OF OILS used in the scrubbing of gases.—Kodak, Ltd. (Tennessee Kodak Corporation). 1440.

METHOD OF PRODUCING HYDROGENATED HYDROCARBON PRODUCTS. R. Leprestre. 1403.

METHOD OF PRODUCING HYDROCARBON PRODUCTS from natural gas.—R. Leprestre. 1404.

TAR PRODUCTS.—Midland Tar Distillers, Ltd., and D. W. Parkes. 1198.

PROCESS FOR THE PRODUCTION OF ALKYL HALIDES from alkenes and hydrogen halide.—N. V. de Bataafsche Petroleum Maatschappij. (Holland, Feb. 1, '39.) 1186.

PROCESS FOR THE CATALYTIC CONVERSION OF CARBON MONOXIDE with hydrogen into hydrocarbons.—H. E. Potts (N. V. Internationale Koolwaterstoffen Synthese Maatschappij) (International Hydrocarbon Synthesis Co.). 1447.

MANUFACTURE OF PULP CONTAINERS for oil-solvents.—Process Development Laboratory, Ltd., and J. E. O. Mayne. 1334.

MANUFACTURE AND APPLICATION OF DERIVATIVES of heterocyclic compounds.—Soc. of Chemical Industry in Basle. (Switzerland, Jan. 30, '39.) 1185.

MANUFACTURE OF HYDROCARBONS BY ALKYLATION.—Standard Oil Development Co. (United States, March 4, '39.) 1180.

PROCESS FOR CONVERTING NORMALLY GASEOUS HYDROCARBONS.—Universal Oil Products Co. (United States, Feb. 9, '39.) 1211; (United States, April 26, '39.) 1212.

Complete Specifications Open to Public Inspection

PRODUCTION OF SHEETS from poly-iso-olefines.—Deutsche Celluloid-Fabrik, A.-G. June 17, 1938. 17628/39.

STABILISING OF CELLULOSIC MATERIALS against deterioration by heat.—E. I. du Pont de Nemours and Co. June 16, 1938. 17678/39.

PROCESS FOR SENSITISING SILVER HALIDE EMULSIONS containing a colour former.—I. G. Farbenindustrie. June 18, 1938. 17735/39.

MANUFACTURE OF COMPOSITIONS OF LEAD and its oxides.—Richardson Co. June 27, 1938. 27444/38.

PREPARATION OF CARBON SULPHOSELENIDE.—Wingfoot Corporation. June 24, 1938. 5091/39.

CONTINUOUS REFINING OF GLYCERIDE OILS and fats.—A. B. Separator. March 29, 1938. 9515/39.

PROCESS FOR THE PREPARATION OF COMPOUNDS OF CERIUM.—Soc. de Produits Chimiques des Terres Rares. April 13, 1938. 10080/39.

MANUFACTURE OF SULPHONIC ACID AMIDE COMPOUNDS.—I. G. Farbenindustrie. April 5, 1938. 10667/39.

PRODUCTION OF AMINO ACIDS.—Corn Products Refining Co. June 20, 1938. 12834/39.

PRODUCTION OF COMPOSITIONS comprising zein.—Corn Products Refining Co. June 23, 1938. 13184/39.

PROCESS FOR THE RESOLUTION OF THE RACEMIC CONDENSATION PRODUCT from phytyl halides and trimethyl hydroquinone.—F. Hoffman-La Roche and Co., A.-G. May 24, 1938. 13458/39.

PROCESS FOR THE PRODUCTION OF SUBSTANTIALLY STABLE FUSED SALTPETRE BATHS.—I. G. Farbenindustrie. June 27, 1938. 14346/39.

PROCESS OF DYEING.—Soc. of Chemical Industry in Basle. May 18, 1938. 14721/39.

PROCESS FOR THE REMOVAL OF MERCAPTANS from hydrocarbon distillates.—N. V. de Bataafsche Petroleum Maatschappij. June 25, 1938. 16072/39.

PRODUCTION OF CONDENSATION POLYMERS.—E. I. du Pont de Nemours and Co. June 24, 1938. 16631/39.

PROCESS FOR REFINING HYDROCARBONS, preferably in the vapour phase, with phosphoric acid.—N. V. de Bataafsche Petroleum Maatschappij. June 21, 1938. 16991/39.

METHOD OF RECOVERING LITHIUM from mineral.—Boliden Gruv, A. B G. June 22, 1938. (Cognate Applications, 17429-31/39.) 17428/39.

SYNTHETIC RESINS.—Nouveautes Industrielles Soc. Anon. June 17, 1938. 16672/39.

PROCESS FOR THE PREPARATION OF O.O¹-DIHYDROXYDIPHENYL.—Rutgerswerke, A.-G. June 22, 1938. 17180/39.

HYDROLYSIS OF CELLULOSE.—Chemische Fabrik Lowenberg Dr. Waith and Co. June 20, 1938. 17566/39.

PROCESS FOR THE PREPARATION OF AMMONIUM NITRATE, and installation for carrying out this process.—Hydro Nitro S. A. June 27, 1938. 17868/39.

PROCESS FOR OBTAINING RESINOUS CONDENSATION PRODUCTS from protein with heavy multivalent alcohols.—R. Boccardi. June 20, 1938. 17870/39.

PROCESSES FOR PURIFYING OILS.—Etablissements J. J. Carnaud and Forges de Basse-Indre. June 27, 1938. 18025/39.

TITANIUM PIGMENTS.—E. I. du Pont de Nemours and Co. June 22, 1938. 18121/39.

Specifications Accepted with Date of Application

EXTRACTION OF CELLULOSE from lignified fibrous material.—W. T. Kerr. March 29, 1938. 516,515.

PREPARING A CONDENSATION PRODUCT of lactic acid in the crystalline form.—B. Sokoloff and Professional Drug Products, Inc. April 2, 1938. 516,518.

MANUFACTURE OF AZO DYESTUFFS.—Soc. of Chemical Industry in Basle. May 22, 1937. 516,425.

MANUFACTURE OF ANTI-KNOCK MOTOR FUEL HYDROCARBONS.—Texaco Development Corporation. June 25, 1937. 516,521.

MANUFACTURE OF COMPOUNDS and derivatives of the cyclopentanohydrophenanthrene series.—Soc. of Chemical Industry in Basle. June 25, 1937. (Cognate Application, 18991/38.) (Sample furnished.) 516,443; June 26, 1937. 516,444; June 28, 1937. 516,445; June 28, 1937. 516,542.

PRODUCTION AND UTILISATION OF PRO-OXIDANTS.—E. W. Fawcett, and Imperial Chemical Industries, Ltd. June 27, 1938. 516,476.

PRODUCTION OF ALIPHATIC ACIDS or esters.—E. I. du Pont de Nemours and Co. June 26, 1937. 516,477.

PRODUCTION OF GAS SUITABLE FOR THE MANUFACTURE OF ALCOHOLS. F. L. Duffield. June 28, 1938. 516,546.

METHOD AND MEANS FOR TREATING WASTE MATERIALS containing organic substances of animal or vegetable origin by mesophile or thermophile anaerobic conversion.—K. Petersen. June 29, 1937. 516,577.

TREATMENT OF HYDROCARBONS.—Houdry Process Corporation. Aug. 5, 1937. 516,489.

MANUFACTURE OF AZO DYESTUFFS.—Soc. of Chemical Industry in Basle. June 30, 1937. (Cognate Application, 19310/38.) 516,585.

MANUFACTURE OF BASIC NITROGENOUS COMPOUNDS.—E. I. du Pont de Nemours and Co. June 29, 1937. 516,586.

OXIDATION OF HYDROCARBONS.—E. I. du Pont de Nemours and Co. June 29, 1937. 516,587.

PRODUCTION OF FATTY ACID ESTERS from starch factory by-products.—Corn Products Refining Co. Aug. 14, 1937. 516,493.

STARCH PRODUCTS, and method of making same.—Corn Products Refining Co. Aug. 16, 1937. 516,588.

METHOD OF REMOVING MAGNESIUM from mechanical mixtures of metallic beryllium and metallic magnesium.—W. H. A. Thiemann (I. G. Farbenindustrie.) June 29, 1938. 516,589.

CONTINUOUS RECTIFICATION OF ALCOHOLS.—E. A. Barbet. June 30, 1937. 516,595.

METHOD FOR DIMINISHING THE SWELLING CAPACITY OF CATION-EXCHANGING RESINS and treatment of same.—I. G. Farbenindustrie. July 13, 1937. 516,608; July 21, 1937. 516,609.

PRODUCTION OF SOLUTIONS of low substituted cellulose ethers. E. I. du Pont de Nemours and Co. July 1, 1937. 516,634.

CORRUGATING AND TRIMMING OF SHEETS OF ASBESTOS CEMENT or the like, when in plastic condition.—A. Magnani. Aug. 5, 1937. 516,650.

PRODUCTION OF HYDROCARBONS.—A. J. V. Underwood. July 21, 1938. 516,555.

PROCESS FOR THE MANUFACTURE OF ISOBUTANE from normal butane. N. V. de Bataafsche Petroleum Maatschappij. Feb. 12, 1938. 516,659.

MANUFACTURE OF DIMORPHOLINE COMPOUNDS.—J. R. Geigy, A.-G. June 10, 1938. 26799/38.

MANUFACTURE OF ACYLAMINO-MORPHOLINE COMPOUNDS.—J. R. Geigy, A.-G. June 11, 1938. 26800/38.

SYNTHETIC RESIN ADHESIVES, and objects employing the same.—Aero Research, Ltd., and C. A. A. Rayner. April 13, 1938. 516,915.

TREATMENT OF ZEIN.—International Patents Development Co. Aug. 2, 1937. 517,165.

MANUFACTURE OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. July 10, 1937. (Cognate Application, 20495/38.) 517,023.

MANUFACTURE AND USE OF AZO DYES.—G. H. Ellis, and H. C. Olpin. July 13, 1938. 516,929.

Weekly Prices of British Chemical Products

TRADE in general chemicals although not particularly brisk is nevertheless following a very steady course, the volume of inquiry being about normal for the period. The recent delay in the movement of chemicals into consumption as a result of transport difficulties appears to have caused no very serious interference at the consuming end and this week has witnessed a speeding up in deliveries. Quotations for Ground in Oil White Lead have been advanced by 10s. per ton following the increased cost of linseed oil. Nitrite of soda is also advanced the makers' quotation now being £18 15s. per ton. In other directions price conditions remain very firm with a number of imported chemicals erratic in quotation. Moderately active trading conditions prevail in the market for coal tar products with the carbolic acid section the chief centre of interest. Values on the whole are steady with a firm undertone.

MANCHESTER.—From the point of view of deliveries into consumption against existing contracts the position is gradually improving on the Manchester chemical market and traders this week report that the difficulties that have recently been confronting transport operations are diminishing. There is a good call for supplies in this area from the cotton and woollen textile industries, and also from the paper trade and other principal users. New buying this week has been on a fair scale and prices generally are on a firm basis. With regard to the by-products the demand for pitch has been relatively slow, but there is a steady demand for virtually all the light distillates at firm rates.

GLASGOW.—Conditions are quieter in the Scottish heavy chemical market, but prices remain the same, except in the case of chromium products, which have advanced.

Price Changes

Rises: Chrometan (Glasgow), Chromic Acid (Glasgow), Lithopone, Sodium Bichromate (Glasgow), Sodium Nitrite, Tartaric Acid (Manchester), White Lead (Ground in oil, English).

* In the case of certain products, here marked with an asterisk, the market is nominal, and the last ascertainable prices have been included.

General Chemicals

ACETIC ACID.—Maximum prices per ton: 80% technical, 1 ton, £34 15s.; 10 cwt./1 ton, £35 15s.; 4/10 cwt., £36 15s.; 80% pure, 1 ton, £36 15s.; 10 cwt./1 ton, £37 15s.; 4/10 cwt., £38 15s.; commercial glacial, 1 ton, £44; 10 cwt./1 ton, £45; 4/10 cwt., £46; delivered buyers' premises in returnable barrels. £4 per ton extra if packed and delivered in glass.

ACETONE.—Maximum prices per ton, 50 tons and over, £49 10s.; 10/50 tons, £50; 5/10 tons, £50 10s.; 1/5 tons, £51; single drums, £52, delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each; delivered in containers of less than 45 gallons but not less than 10 gallons £10 10s. per ton in excess of maximum prices; delivered in containers less than 10 gallons each £10 10s. per ton in excess of maximum prices, plus a reasonable allowance.

*ALUM.—Loose lump, £8 7s. 6d. per ton d/d.

*ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs.

AMMONIA, ANHYDROUS.—99.95%, 1s. to 2s. per lb. according to quantity in loaned cylinders, carriage paid; less for important contracts.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £18 per ton, in casks, ex wharf. See also Salammoniac.

*ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—99/100%, about £25 per ton, ex store.

BARIUM CHLORIDE.—98/100%, prime white crystals, £11 10s. 0d. to £13 0s. 0d. per ton when available, bag packing, ex works; imported material would be dearer.

BLEACHING POWDER.—Spot, 35/37% £9 5s. per ton in casks, special terms for contract.

BORAX, COMMERCIAL.—Granulated, £20 10s. per ton; crystal, £21 10s.; powdered, £22; extra finely powdered, £23; B.P. crystals, £29 10s.; powdered, £30; extra fine, £31 per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £64; powder, £65; in tin-lined cases for home trade only, packages free, carriage paid in Great Britain.

BORIC ACID.—Commercial granulated, £34 10s. per ton; crystal, £35 10s.; powdered, £36 10s.; extra finely powdered, £38 10s.; large flakes, £47; B.P. crystals, £43 10s.; powdered, £44 10s.; extra fine powdered, £46 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain.

CALCIUM BISULPHITE.—£7 10s. per ton f.o.r. London.

*CALCIUM CHLORIDE.—GLASGOW: 70/75% solid, £5 12s. 6d. per ton ex store.

CHARCOAL LUMP.—£10 to £12 per ton, ex wharf. Granulated £11 to £14 per ton according to grade and locality.

*CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 3¾d. per lb.; liquor, £19 10s. per ton d/d station in drums. GLASGOW: Crystals 4d. per lb. in original barrels.

CHROMIC ACID.—10¼d. per lb., less 2½%; d/d U.K. GLASGOW: 1s. 0¼d. per lb. for 1 cwt. lots.

CHROMIC OXIDE.—1s. 1d. per lb., d/d U.K.

CITRIC ACID.—1s. 2d. per lb. MANCHESTER: 1s. 3d.

*COPPER SULPHATE.—Nominal.

CREAM OF TARTAR.—100%, £6 2s. to £6 7s. per cwt., less 2½%. Makers' prices nominal, imported material about £170 per ton.

FORMALDEHYDE.—40% by volume, £23 5s. to £25 per ton, according to quantity, d/d in sellers' returnable casks.

FORMIC ACID.—85%, £44 10s. per ton for ton lots, carr. paid, carboys returnable; smaller parcels quoted at 46s. 6d. to 49s. 6d. per cwt., ex store.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

HEXAMINE.—Technical grade for commercial purposes, 1s. 4d. per lb.; free-running crystals are quoted at 1s. 7d. per lb.; carriage paid for bulk lots.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 9s. 2d. to 13s. per lb., according to quantity.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £30 10s. per ton; 50% by weight, £35; 80% by weight, £60; pale tech., 50% by vol., £36; 50% by weight, £42; 80% by weight, £67. One ton lots ex works; barrels returnable.

LEAD ACETATE.—White, £48 to £50, ton lots.

LEAD NITRATE.—About £40 per ton in casks.

LEAD, RED.—English, 5/10 cwt., £41 10s.; 10 cwt. to 1 ton, £41 5s.; 1/2 tons, £41; 2/5 tons, £40 10s.; 5/20 tons, £40; 20/100 tons, £39 10s.; over 100 tons, £39 per ton, less 2½ per cent., carriage paid; non-setting red lead, 10s. per ton dearer in each case; Continental material, £1 per ton cheaper.

LEAD, WHITE.—Dry English, less than 5 tons, £51; 5/15 tons, £47; 15/25 tons, £46 10s.; 25/50 tons, £46; 50/200 tons, £45 10s. per ton, less 5% carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £59 10s. 5/10 cwt., £58 10s.; 10 cwt. to 1 ton, £58; 1/2 tons, £56 10s.; 2/5 tons, £55 10s.; 5/10 tons, £53 10s.; 10/15 tons, £52 10s.; 15/25 tons, £52; 25/50 tons, £51 10s.; 50/100 tons, £51 per ton, less 5% carriage paid. Continental material £2 per ton cheaper.

LITHARGE.—10 cwt.-1 ton, £34 15s. per ton.

MAGNESITE.—Calcined, in bags, ex works, about £9 to £10 per ton.

MAGNESIUM CHLORIDE.—Solid (ex wharf), £10 per ton.

*MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY PRODUCTS.—Controlled prices for 1 cwt. quantities: Bichloride powder, 9s. 1d.; bichloride lump, 9s. 8d.; bichloride ammon. powder, 10s. 7d.; bichloride ammon. lump, 10s. 5d.; mercurous chloride, 10s. 11d.; mercury oxide, red cryst., B.P., 12s. 3d.; red levig. B.P., 11s. 9d.; yellow levig. B.P., 11s. 7d.

*METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities.

*NITRIC ACID.—Spot, £25 to £30 per ton, according to strength, quantity and destination.

OXALIC ACID.—£59 5s. per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels, 59s. 9d. to 60s. per cwt., ex store; deliveries slow.

*PARAFFIN WAX.—GLASGOW: 3¾d. per lb.

POTASH, CAUSTIC.—Liquid, £25 to £30 per ton, according to quantity.

POTASSIUM BICHROMATE.—5¾d. per lb. carriage paid. GLASGOW: 5¾d. per lb., carriage paid.

POTASSIUM CHLORATE.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

POTASSIUM IODIDE.—B.P., 8s. to 11s. 2d. per lb., according to quantity.

POTASSIUM NITRATE.—Small granular crystals, £26 to £29 per ton ex store, according to quantity.

POTASSIUM PERMANGANATE.—B.P. 1s. 3½d. per lb.; commercial, 143s. per cwt., d/d.
POTASSIUM PRUSSIATE.—Yellow, about 1s. 8d. per lb., supplies scarce.
SALAMMONIAC.—Dog-tooth crystals, £42 per ton; medium, £38; fine white crystals, £16; in casks, ex store.
SALT CAKE.—Unground, spot, £3 15s. per ton.
SODA ASH.—Light 98/100%, £5 17s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£25 to £26 per ton, ex wharf.
SODIUM BICARBONATE.—About £10 10s. to £11 10s. per ton, in bags.
SODIUM BICHROMATE.—Crystals, 4¾d. per lb., net d/d U.K. with rebates for contracts. GLASGOW: 5¾d. per lb., carriage paid.
SODIUM BISULPHITE POWDER.—60/62%, £12 10s. to £14 per ton d/d in 2-ton lots for home trade.
SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.
SODIUM CHLORATE.—£27 10s. to £32 per ton, d/d according to quantity.
SODIUM HYPOSULPHITE.—Pea crystals, £16 17s. 6d. per ton for 2-ton lots; commercial, £13 10s. per ton. MANCHESTER: Commercial, £13; photographic, £16 10s.
SODIUM IODIDE.—B.P., for not less than 28 lb., 8s. 10d. per lb.; for not less than 7 lb., 10s. 9d. per lb.
*SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 5s. per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 15s. per ton for ton lots.
SODIUM PERBORATE.—10%, £4 per cwt. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £16 to £17 per ton delivered for ton lots. Tri-sodium, £18 per ton delivered per ton lots.
SODIUM PRUSSIATE.—4¼d. to 5¼d. per lb.
SODIUM SILICATE.—£8 2s. 6d. per ton.
*SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. MANCHESTER: £4.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £13; crystals, £9 15s.
*SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
*SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 5½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. Makers' prices nominal; imported material 2s. 3d. to 2s. 6d. per lb., ex wharf. MANCHESTER: 1s. 5¾d. per lb.
ZINC OXIDE.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.
ZINC SULPHATE.—Tech., about £19 10s., carriage paid, casks free.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 9½d. to 1s. 6d. per lb., according to quality. Crimson, 1s. 7½d. to 1s. 10½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.
CARBON DISULPHIDE.—£29 to £34 per ton, according to quantity, in free returnable drums.
CARBON TETRACHLORIDE.—£48 to £53 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 1s. 3d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 5¾d. to 6¾d. per lb.; dark 5½d. to 6d. per lb.
LITHOPONE.—30%, £18 17s. 6d. per ton; 60%, £31 to £32 per ton. Imported material would be dearer.
SULPHUR CHLORIDE.—6d. to 8d. per lb., according to quantity.
VEGETABLE BLACK.—£35 per ton upwards; 28/30%, £15 10s. 0d.; 60%, £29, delivered buyers' premises.
VERMILION.—Pale or deep, 8s. 5d. per lb., for 7 lb. lots.
ZINC SULPHIDE.—About £63 per ton ex works.

Plus 5% War Charge.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—Per ton in 6-ton lots d/d farmer's nearest station up to January 31, 1940, £9; February, £9 3s.; March/June, £9 6s.
CALCIUM CYANAMIDE.—£12 10s. for 5-ton lots per ton net f.o.r. or ex store, London. Supplies small.
"NITRO-CHALK."—£8 18s. per ton, in 6-ton lots, d/d farmer's nearest station, January/June delivery.
CONCENTRATED COMPLETE FERTILISERS.—£11 18s. to £12 4s. per ton in 6-ton lots, d/d farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£11 14s. to £16 6s. per ton in 6-ton lots, d/d farmer's nearest station.

Coal Tar Products

BENZOL.—Industrial (containing less than 2% of toluol), 2s. to 2s. 1d. per gal., ex works, nominal.
CARBOLIC ACID.—Crystals, 9d. to 11d. per lb.; Crude, 60's, 3s. 3d. to 3s. 6d., according to specification. MANCHESTER: Crystals, 10d. to 11d. per lb., d/d; crude, 3s .6d. to 3s. 9d.; naked, at works.
CREOSOTE.—Home trade, 5d. per gal., f.o.r., makers' works; exports 6d. to 6¼d. per gal., according to grade. MANCHESTER: 4½d. to 6½d.
CRESYLIC ACID.—99/100%, 2s. 11d. to 3s. 3d. per gal., according to specification. MANCHESTER: Pale, 99/100%, 3s.
NAPHTHA.—Solvent, 90/160°, 1s. 8d. to 1s. 9d. per gal.; solvent, 95/60°, 1s. 11d. to 2s., naked at works; heavy, 90/190°, 1s. 3d. to 1s. 5d. per gal., naked at works, according to quantity. MANCHESTER: 90/160°, 1s. 6½d. to 1s. 9d. per gal.
NAPHTHALENE.—Crude, whizzed or hot pressed, £10 to £11 per ton; purified crystals, £16 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. MANCHESTER: Refined, £17 to £18.
PITCH.—Medium, soft, 35s. per ton, f.o.b. MANCHESTER: 37s. 6d., f.o.b. East Coast.
PYRIDINE.—90/140°, 19s. to 20s. per gal.; 90/160°, 16s. to 18s. 6d.; 90/180°, 3s. 9d. to 4s. 6d. per gal., f.o.b. MANCHESTER: 17s. to 19s. 6d. per gal.
TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 5d., nominal. MANCHESTER: Pure, 2s. 5d. per gal., naked.
XYLOL.—Commercial, 2s. 7d. per gal.; pure, 2s. 9d. MANCHESTER: 2s. 9d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 5s. to £8 per ton; grey, £10 to £12. MANCHESTER: Grey, £14.
METHYL ACETONE.—40.50%, £35 to £38 per ton.
WOOD CREOSOTE.—Unrefined, 1s. to 1s. 3d. per gal., according to boiling range.
WOOD NAPHTHA, MISCIBLE.—3s. 7d. to 4s. per gal.; solvent, 4s. to 4s. 6d. per gal.
WOOD TAR.—£4 to £5 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—1s. 10d. per lb., for cwt. lots, net packages.
BENZIDINE, HCl.—2s. 7d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P (ex toluol).—1s. 11d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-CRESOL 34/35° C.— 1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—2s. 1½d. to 2s. 7d. per lb.
DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 11½d.
DIPHENYLAMINE.—Spot, 2s. 3d. per lb.; d/d buyer's works.
GAMMA ACID, Spot, 4s. 4½d. per lb. 100%, d/d buyer's works.
H ACID.—Spot, 2s. 7d. per lb.; 100%, d/d buyer's works.
NAPHTHIONIC ACID.—1s. 10d. per lb.
β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.
α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.
β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.
o-NITRANILINE.—4s. 3½d. per lb.
m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 10d. to 2s. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—10d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8½d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—11d. per lb., in 8/10 cwt. drums, drums extra.
p-TOLUIDINE.—2s. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—February 5.—For the period ending March 2, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £46 5s. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £35 12s. 6d.; refined deodorised, £36 10s. SOYA BEAN OIL, crude, £33; refined deodorised, £37. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £31 7s. 6d. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £30 15s. PALM OIL, refined deodorised, £33. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £40. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £33. ACID OILS.—Groundnut, £24; soya, £22; coconut and palm kernel, £22 10s. ROSIN, 25s. to 35s. per cwt., ex wharf, according to grade. TURPENTINE, 54s. 9d. per cwt., spot, American, including tax, ex wharf, barrels, and ex discount.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ERNEST J. COLE & PARTNERS, LTD., Bristol, oil dealers, etc. (M., 10/2/40.) Jan. 25. £225 mortgage, to E. R. Tanner, Bristol; charged on 13 Kings Road, Bristol. *Nil. Feb. 28, 1939.

HEMINGWAY & CO., LTD., London, E., paint and varnish manufacturers. (M. 10/2/40.) Jan. 25. £250 debenture., to Mrs. F. E. Harris, Woodford Green; general charge (subject to etc.). *£12,500. Sept. 21, 1939.

County Court Judgments

H. KEANE (male) (trading as AROMA PRODUCTS CO.), 32 Cloudesley Place, N.1. (C.C. 10/2/40), manufacturing chemists. £34 17s. 3d. Nov. 14.

ZEMS LTD., 48 Cannon Street, E.C.4. (C.C. 10/2/40.) manufacturing chemists. £15 12s. 6d. Nov. 17.

Company News

Peter Brotherhood, Ltd., have declared an interim dividend on ordinary shares of 8 per cent, less tax (same).

Lightalloys, Ltd., have declared an interim dividend of 7½d. per share, less tax at 7s. (last year, 9d. per share).

England China Clays, Ltd., have declared a dividend on ordinary shares of 1½ per cent., less tax, for 1939, compared with 1 per cent. in 1938.

The English Velvet and Cord Dyers' Association report that the total profit figure for the calendar year 1939 is up from 1938 level of £13,885 to £40,014, while after deduction of depreciation and interest, the net revenue balance of £3,952 contracts with a net loss of £12,828 for 1938.

The Electrolytic Zinc Company of Australia earned a gross profit of £622,029 in the year to June 30, 1939, compared with £729,435 in the previous year. Net profit totals £405,756 compared with £459,524. Dividends totalling 15 per cent. have been paid on the preference and ordinary shares.

New Companies Registered

Anglo-French Fats & Oils, Ltd. (358,892).—Private company. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in all kinds of oils (vegetable, mineral and essential), and all varieties of fats for soap makers, etc. Directors: Harry T. Cusden; Mrs. Evelyn James. Registered office: 228, Bishopsgate, E.C.2.

Robert Haldane & Co., Ltd. (21,291).—Private company. Capital: £1,000 in 1,000 shares of £1 each. To carry on the business of manufacturing chemists, wholesale and retail druggists, etc. Directors: Robert H. B. Haldane; William B. Hardie, and James S. Hutchison. Secretary: J. S. Hutchison. Registered office: 145 St. Vincent Street, Glasgow.

Ekon Products, Ltd. (358,773).—Private company. Capital £100 in 1s. shares. To carry on the business of manufacturers of and dealers in fuel economisers, patent fuel and coke, distillers of coal, shale and other substances, manufacturers of gas, motor spirit, naphtha oils, dyes, benzenes, and similar substances, manufacturing and research chemists, etc. Directors: Bernard R. Willcox, Edward B. Fletcher. Solicitors: A. L. Phillips and Co., 6 Holborn Viaduct, E.C.1. Registered office: 240 Ealing Road, Wembley, Middlesex.

Syntholeum, Ltd. (358,947).—Private company. Nominal capital: £1,000 in 1,000 shares of £1 each. Objects: To carry on the business of producers of hydrocarbons of all kinds from coal, coke or coke oven gas, manufacturers, distillers, refiners and preparers of and dealers in oils, lubricants, greases, paraffin, benzol, motor spirits, tar, bitumen and petroleum, to build plant and finance experiments in connection with by-products and hydrocarbons, etc. Subscribers:—C. F. Ward Jones, Harness Grove, nr. Worksop: Douglas Hay, N. E. Webster, A. Blenkinsop, O. J. Philipson, J. Brass, F. Middleton, J. Hunter, A. C. F. Assinder, J. H. Laverick, L. C. Hodges, G. A. Hebden, Sir Samuel Roberts, Bt. Solicitors: Johnson, Weatherall & Co., 7 King's Bench Walk, E.C.4.

Chemical Trade Inquiries

Canada.—A firm of agents established at Montreal wishes to obtain the representation, on a purchasing basis, of United Kingdom manufacturers of vegetable oils for Eastern Canada. (Ref. No. 61.)

Straits Settlements.—H.M. Trade Commissioner at Singapore reports that the Singapore Municipal Water Department is calling for tenders (Contract No. W.E. 88) for the supply and delivery of two chemical dry feed machines. Tenders, endorsed "Tender for supply of two chemical dry feed machines," should be addressed to the Municipal Secretary, Municipality, Singapore, S.S., by whom they will be received up to 4 p.m. on Tuesday, April 30. (Ref. T. 15853/40.)

Chemical and Allied Stocks and Shares

BRITISH Funds and other investment securities were slightly less active this week, but the undertone was firm, and good buying was in evidence on any easing of prices. Ordinary or equity shares were inclined to improve, although movements were small and relatively unimportant.

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Imperial Chemical ordinary and preference at 30s. 6d. and 32s. 9d. were slightly lower on balance, but remained active, awaiting the financial results which fall to be issued next month. B. Laporte were higher and changed hands around 61s., while British Drug Houses have been marked up further from 23s. 9d. to 25s. on market hopes of a slightly larger dividend than the 6 per cent. paid for the previous year. British Glues at 6s. 9d. and Blythe Colour Works at 7s. 6d. held their recent gains, while British Tar Products were better at 6s. 10½d. and the ordinary shares of the Valor Company have advanced sharply to 27s. on market estimates of the dividend for the past year, which range from 10 per cent. to 12½ per cent.

* * * *

Lever & Unilever were slightly lower at 29s. 3d., but the preference units more than maintained their recent gains. British Oil & Cake preferred ordinary were slightly higher at 39s. 3d.; United Premier Oil & Cake at 8s. were the same as a week ago. Small fluctuations were shown by United Molasses and Borax Consolidated, which, however, at 25s. 6d. and 25s. respectively were virtually unchanged on balance. Wall Paper deferred have been marked down from 16s. 3d. to 15s. 9d. Pinchin Johnson and other paint shares improved, awaiting the results, due during the next few weeks, sentiment in regard to which has been influenced favourably by the improved payment recently announced by Blundell Spence.

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Crittall Manufacturing, British Plaster Board and other shares of companies associated with the building trades remained out of favour, the disposition being to await the Associated Cement results, due next month. Courtaulds have continued active in advance of the dividend announcement, and other rayon shares were fairly steady, but cotton textile securities were again less active than in recent weeks. Dunlop Rubber have shown a better tendency on balance, but as in the case of J. & P. Coats, which also has important interests abroad and overseas, the market is uncertain whether the distribution for the year will be maintained.

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Iron and steel securities remained in better request, partly owing to expectations of further expansion of armament work. Higher prices have ruled for Dorman Long, Consett Iron, Guest Keen and Tube Investments. Cerebos improved and now yield only 4 per cent. The market is, however, taking the view that there are good prospects of the 40 per cent. dividend being repeated, and the strength of the finances suggests the possibility of a further scrip bonus in the future. General Refractories had a steadier appearance at 8s. and International Nickel were slightly better on the maintenance of the quarterly dividend. Triplex Glass were around 18s. 6d., but United Glass Bottle remained firmly held, pending the forthcoming results. Fison Packard were inactive, and were again quoted at 36s. 10½d. Goodlass Wall improved to around 9s. 6d., and Imperial Smelting were firmer at 12s. 6d. Monsanto Chemicals 5½ per cent. preference continued to be quoted at 21s. 3d. Henry C. Stephens improved from 16s. 3d. to 17s. 6d.

* * * *

Boots Drug were little changed at 40s. 3d., while Sangers were 20s. 6d., and Timothy Whites 24s. Beechams Pills deferred changed hands round 7s. 9d. With the exception of Burmah Oil which improved on balance, leading oil shares showed a reactionary trend.